TECHNOLOGY DEPT.

The Chemical Age

VOL LXIII 25 NOVEMBER 1950 No 1637

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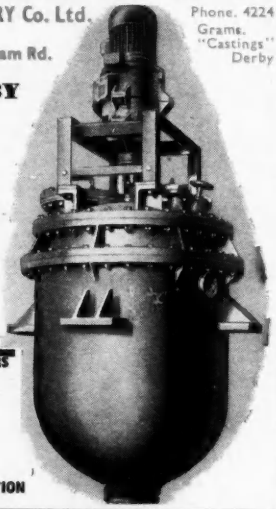

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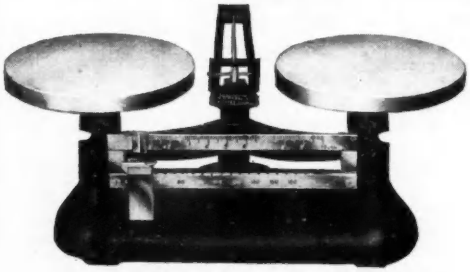

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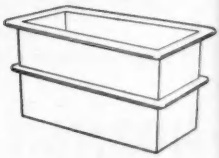

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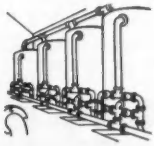
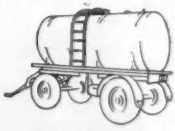


Storage Vessels



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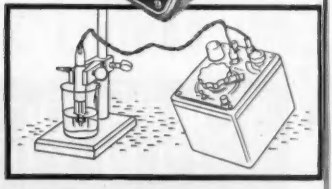

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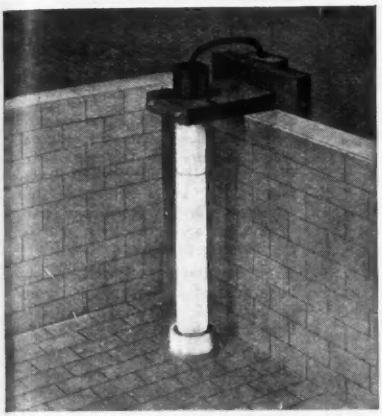

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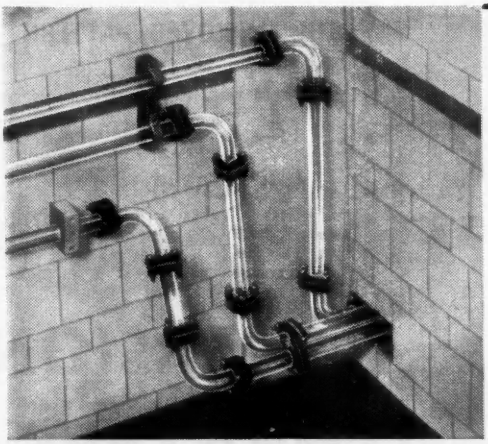

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P9 8

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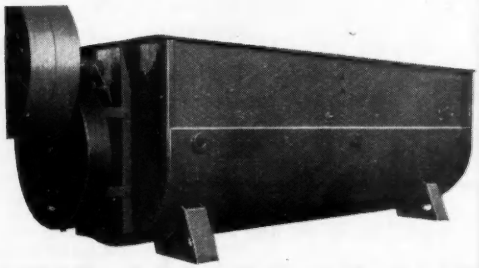

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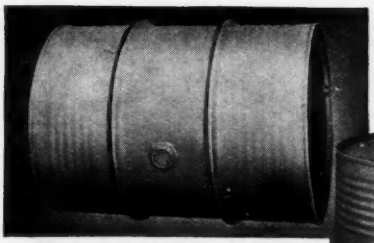

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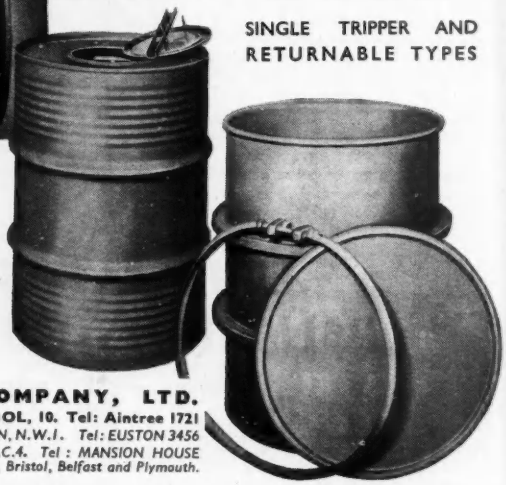

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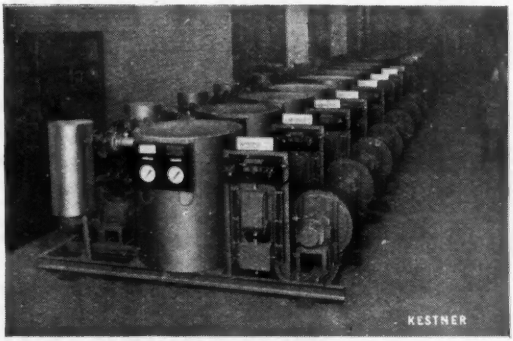

The illustration shows a batch of air dryers supplied for the maintenance of low humidity in ships.

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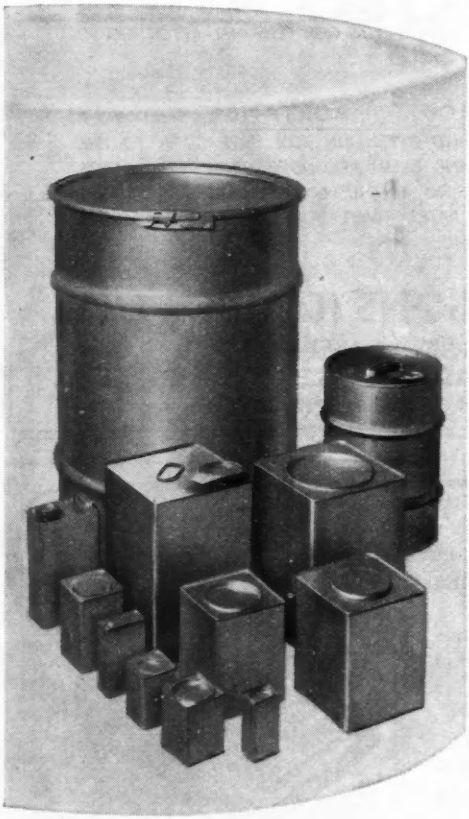

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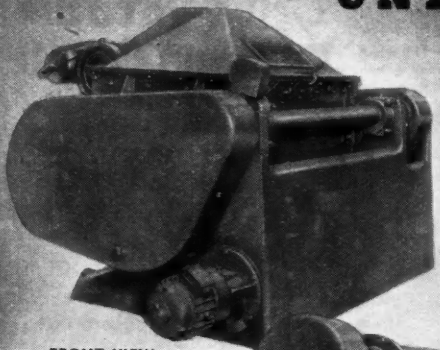

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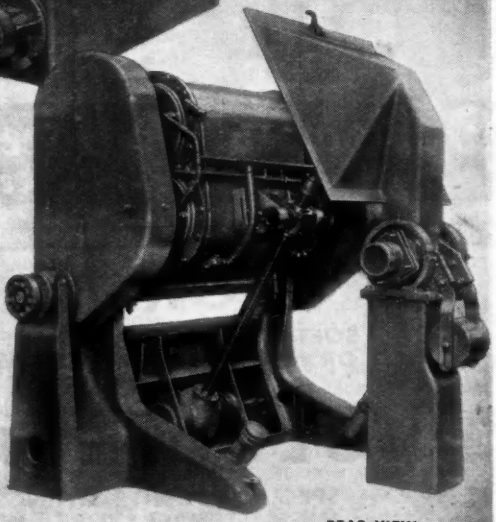

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The
Chemical Age

The Weekly Journal of Chemical Engineering and Industrial Chemistry

BOUVERIE HOUSE 154 FLEET STREET LONDON E.C.4

Telegrams: ALLANGAS FLEET LONDON · *Telephone:* CENTRAL 3212 (26 lines)

Volume LXIII 25 November 1950 Number 1637

Perfecting Analysis

THE extremely rapid advances made in the equipment, methods and capabilities of modern analysis have placed this branch of chemistry on a plane which calls for a very high standard of performance in all the contributory departments. Obviously, however, there are a number of ways in which the full advantages of the new techniques, and the progressiveness of most present-day analysts, are being rendered much less effective than they could be. Slipshod practice in sampling is one of them.

When, for example, it is established that duplicate determinations of sulphur in an oil sample have differed by 0.02 per cent, what firm conclusion can possibly be drawn about the actual sulphur content of the consignment? In the conditions in which some laboratory samples are taken it is doubtful if it would be safe to give any ruling about the content of the bulk material. One of the reasons is that the sampler too often is still a very lowly individual, sometimes virtually untrained and generally unsupervised. Yet on this insecure base of non-representative sampling may be built the most elaborate superstructure achieved by polarographic analysis and other precise and elaborate physical chemical methods. Much can be done simply by a little intelligent investigation by the chemist looking for sources of heterogeneity or periodicity in the consignments and evidence of stratification or differences in surface and bulk. Briefly, procedure and analytical technique have advanced very much faster than have the routine activities, but there are still other chinks in the analyst's equipment, especially perhaps the inadequate use made of the mathematician's advantages.

Too few analysts collaborate with the mathematician or possess themselves of much of his equipment. The scope of chemical analysis should certainly not stop short of mathematical analysis of laboratory results. The recent annual publication, the *Transactions* of the Institution of Chemical Engineers, bears witness to the importance of the mathematical method in an associated field.

It is still common to carry out chemical analyses in duplicate and to take agreement between the two as sufficient evidence of accuracy of the laboratory method. That disregards the fact that duplication measures only the accuracy of one analyst and of one sample. Duplicates by one analyst, using one sample bottle and the same set of apparatus, certainly give better agreement than would true duplication—of analysts' samples and

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The annual subscription to THE CHEMICAL AGE is 30s. single copies, 9d.; post paid, 1s.; SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3970). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited.

apparatus—but the accuracy of prediction cannot be of a high order.

These are, of course, not the only respects in which industrial analysis still falls a long way short of the ideal. Even the best estimate of, say, an element in a product, relates only to the time at which it was taken. The chemist is not often invited to consider possible causes of change in quality, such as the influence of change of ambient temperature during the day, and to space the sampling so as to compensate for this. It may be necessary to alter his sampling policy and procedure, which would be troublesome but generally fully justified.

In a broader field of analysis—of chemical results—some have noted another serious defect of the traditional methods. In a system of many variables, effects are investigated by holding constant all but one of the variables. Effects produced by altering each one in turn are then noted. The sheer complexity and number of experiments demanded by this approach are self-evident. This is itself a major drawback, yet there is one more fundamental. We may be missing the evidence of interaction between effects.

"We have usually no knowledge that any one factor will exert its effect independently of all others that can be varied," wrote Professor R. A. Fisher, F.R.S., who decided that any investigator who proceeds along these lines was probably "the unfortunate victim of a doctrinaire theory as to how experimentation should proceed." The mathematicians are fortunately again able to point a way out of this dilemma. There is more than one method of laying out groups of experiments involving variation of several factors. When a system is capable of being affected by changes in concentration, pressure, temperature and flow rate a scheme can be devised to test all four at four separate levels. The results may then be analysed for the influence of each variable and for their interaction. There, as Brownlee points out in "Industrial Experimentation" (HMSO, 1949), a comparison of catalysts for contact oleum manufacture might be made at one temperature X and A found better than B. Meanwhile another investigator, ascertaining the most effective inlet gas temperature on catalyst B, may well have shown that at Y degrees, catalyst B is better than A.

For most of us, fairly advanced applications of mathematics hold no charm. It is, however, very clear that, challenged by the exactitude which current technique and present-day instruments permit, the rule-of-thumb philosophy has had its day.

Notes and Comments

Soaring Chemical Exports

THIS year is making at its close a series of records for sales of British chemicals in the markets of nearly all countries of a magnitude which easily outstrips the more optimistic estimates of the Economic Surveys. October's total of nearly £10.6 million represents the effect of largely increased orders from most countries—except Argentina and the territories under U.S.S.R. influence—whose capacity to continue purchases on the same scale may be doubted. It is fairly clear, however, that not all these are strategic purchases; much of the increment has come from Commonwealth countries and the marked revival of the important Indian market, which was for long virtually closed to some of the important basic chemical materials, has been a substantial factor. The influence of American policies, which has resulted in some restriction of its chemical shipments, cannot be dismissed in assessing the continuance of these boom conditions. Even more remarkable is the five-fold increase in dollar purchases of British chemicals since last Autumn, culminating in October in sales worth £691,517.

Synthetic Fibres

AN appeal for greater research and investigation of synthetic fibres and a survey of their impact on the textile industry was made by Mr. J. G. Evans, chief chemist of the Bradford Dyers' Association, in an address to the Royal Institute of Chemistry and the Society of Dyers and Colourists last week. Greater use of synthetic fibres as a means of curbing the rising cost of living has been put forward in several public pronouncements recently, but Mr. Evans rightly emphasised that although there remain some thousands of man-made fibres still to be examined, there was bound to be an inevitable time-lag between the scientific discovery and its application in industry. Evaluation of synthetic fibres was more often than not a lengthy and costly procedure. Nylon was said to have cost the Du Pont company $27 m. Another problem for the textile industry was that of devising plant for the new fibres which presented their own special problems and a great opportunity to re-design machinery. Dyeing was another matter where existing methods might have to be discarded in order to grapple with an unorthodox approach. The only new fibre to be manufactured in the near future is Ardil, which is expected to be in quantity production next year. It would seem therefore that any early relief to living costs from the application of synthetic fibres to the textile industry can be discounted.

Less Sulphur in 1951

FIFTY years ago Frasch perfected his "hot-water" process of mining sulphur. At that time the U.S.A. was importing about 170,000 tons of brimstone every year. To-day the U.S.A. exports over eight times that tonnage. In 1900, the U.S. annual production of sulphuric acid was about one million tons, made by the chamber process. Now, in 1950, it is over 12 million tons, and about three-quarters of all U.S. sulphuric acid is made by the improved contact process. These significant figures give an indication of the vast expansion of the U.S. sulphur industry in the last fifty years. No less important, however, is the impact that the development of the American sulphur industry has had upon the U.S. chemical industries in particular and those of the world in general. New uses for sulphur and its derivatives are continually being found and provide to a great extent the necessity for the enormous current production. The widening uses of sulphur derivatives in organic synthesis, for example, and war requirements of sulphuric acid are absorbing large portions of U.S. sulphur production, and these outlets seem likely to continue large for a long time. With ever increasing know-

ledge regarding the function of metabolism and disease there is a strong possibility of a still greater pharmaceutical demand for sulphur. Contemplation of future requirements only serves to aggravate the fear current in the U.S.A. that the indigenous supply is likely soon to be inadequate. Only the discovery of fresh deposits can completely solve that problem and, meanwhile America's customers and especially this country seem destined to go very short. An informed comment on the British situation this week suggests that the sulphuric acid industry will be lucky if it receives next year 50 per cent of its present sulphur supplies.

Cities Without Smoke

TWO circumstances seem predominantly to characterise what is loosely termed " the smoke problem " —that it is well nigh intolerable and yet incurable in present conditions of society. Whatever can be done to mitigate the conditions in which in some of the worst industrial centres up to 2000 tons per acre of solids alone may be deposited by the chimneys will certainly not be forwarded by evading the facts, unpalatable though they are. How solidly entrenched are the conditions which make a varying amount of " smog " a normal winter state in most British cities was made very clear in the course of the paper which Dr. Albert Parker presented before the Royal Society of Arts in London on Wednesday. In this, the director of the DSIR Fuel Research Station incidentally disposed of a popular fiction of uninformed propaganda—that if all industrial chimneys were bereft of smoke " cities without smoke " would become a reality. The factor which chiefly determines the production of noxious—and wasteful—by-products of coal combustion is the efficiency, or the reverse, of grates and fire boxes and of stoking. Every good industrial boilerman knows that, but not the stoker of the domestic fire. If all the industrial coal burners were brought to a state of perfection, at a capital cost which would bear comparison with the Chancellor of Exchequer's figures, the much more numerous domestic chimneys would still emit by far the largest contribution of atmospheric smoke, about 900,000 tons each year. The emission from coke ovens and gas industry, of which Dr. Parker gave convincing statistical evidence, is by comparison trivial and the general run of industrial chimneys is responsible only for about 700,000 tons. Domestic grates are also the second largest sources of the destructive sulphur oxide fumes. The fuel expert's clear exposition of the relative responsibilities for the continuance of the smoke problem does not encourage slackening of any practicable steps to minimise the flow from the smoke stacks when they are not impossibly costly; but it disposes of idle dreams of banishing overnight the problem upon which committees have been cogitating since 1819.

Ancestors of an Industry

WHILE some of the associations in chemical industry are making a tentative approach to providing a public information service, I.C.I., Ltd., has just completed an independent programme which may have afforded to some million people outside the industry a decorative and memorable introduction to the background of current achievement. This was the series of advertisements " Ancestors of an Industry," which has now deservedly been given permanent existence in book form. These advertisements told the story of British scientific achievement from Robert of Chester, the English monk who in 1144 opened to the West the door of Eastern chemical knowledge, up through the centuries to Sir William Bragg and Lord Rutherford. The volume, excellently produced by the Kynoch Press, was prepared with the assistance of Dr. E. J. Holmyard, editor of *Endeavour*. Nearly all the illustrations have been based on contemporary portraits. It is to be hoped that I.C.I. will be able to make this series of biographical sketches widely available. There is no doubt that, as the introduction suggests, it will serve to remind people, both at home and overseas, that though scientific discovery knows no national frontiers, Britain's contribution to the progress of science is second to none.

SULPHUR SUPPLIES ENDANGERED

Uncertainty About U.S. Shipments in 1951

THE insecurity of British sulphur supplies next year has been underlined by the adoption in the U.S.A. of the principle of substantially reducing sulphur exports in the interests of the rising scale of home demand and of strategic considerations, undeterred by the large increases in the production of American sulphur. (THE CHEMICAL AGE, *63*, 674).

In the first nine months of this year practically all the sulphur imported here —346,078 tons out of 346,194 tons—came from the U.S.A., and of last month's total of 36,227 tons all but 87 tons came from the same source. While no definite figure has yet been given to the extent of the intended reduction of U.S. exports, knowledgeable sources here believe it is possible that next year's sulphur shipments to Europe as a whole may be less than this country alone is using.

The amount Great Britain is to receive is still problematical, but a reduction of 50 per cent of the present imports seems not unlikely. The exports of sulphur from U.S., which total about 10 per cent of production have, in the past, been sufficient to enable the British sulphuric acid industry to meet all its requirements. But the vendors of sulphur have now been entirely deprived of control of sulphur supplies. The amount of sulphur that Europe will receive next year will be determined by the U.S. Government.

No one in Britain knows what will happen next year, and there may, in fact, be a gap in British sulphur supplies due to the changed circumstances. No shipments of sulphur have so far been allocated for January, 1951.

There is no simple means of overcoming the present difficulties. The alternative methods of producing sulphuric acid from pyrites and anhydrite, if introduced on a large scale, would prove an additional economic burden. The cost of producing sulphuric acid by these methods is, in the case of pyrites, about three times as great as by the conventional processes, while the anhydrite method costs about six times as much. The conversion or re-equipping of standard plants for these new methods would be a long and costly business. Apart from the very large capital expenditure involved there are the additional difficulties of finding sites for building and of providing the necessary materials, etc. If the reduction in acid supply is considerable, the effect upon British economic recovery will be widespread.

Supplementing supplies from abroad by recovering sulphur from coal or coke burning, for example, is not at present commercially practicable. Although British coal contains about 1.5 per cent of sulphur, on combustion most of this is converted to gaseous sulphur dioxide. The production of sulphur from such SO_2 would entail bringing vast volumes of the gas into intimate contact with some reagent which will quickly dissolve or combine with the SO_2 to give a product readily separable from the gas.

Precautionary Rationing of Basic Solvent Supplies

THE possibility of a serious shortfall in supplies of a material of basic importance to many chemical and process industries, arising from current conservation policy in the U.S.A., is foreshadowed in a statement issued this week by British Industrial Solvents, Ltd. This says that continued supplies of isopropanol from the U.S.A., on which the majority of acetone production in this country is at present based, have become most uncertain, owing to the effect of the Korean war on American domestic requirements.

All possible pressure is being brought to bear, states B.I.S., to ensure that supplies are maintained until production is available from the B.I.S. associate company's isopropanol plant at Grangemouth, which is expected early next year.

Until the position is clarified B.I.S. will be obliged, as a precautionary measure, to make a severe reduction in deliveries of acetone, to avoid the disastrous consequences of almost complete cessation of supplies in the first quarter of 1951. This will be done by limiting all deliveries from December 1 onwards to the monthly rate of approximately 60 per cent of the average monthly quantity purchased during the six months April/September 1950. It will not be possible to deliver supplementary quantities between now and December 1.

PRECIOUS METAL RESEARCH

Chemical and Metallurgical Aspects

THE wide range of activities of the Design and Research Centre for the Gold, Silver and Jewellery industries, since its inception in 1946, was illustrated this week in a display in the new exhibition room, Goldsmiths' Hall, London.

Among the research exhibits was a panel devoted to the problem of firestain in silver, its scientific explanation and research for a remedy. It was found that if one per cent of aluminium was included in the sterling silver, oxidation formed a surface layer of aluminium oxide which stopped the deeper penetration of oxygen.

In the metallurgical laboratory were demonstrations of temper hardening of sterling silver, preparation of specimens for microscopical examination and the hardness testing of metals, the vacuum evaporation of metals (aluminium, etc.), by heating a tungsten filament in a bell jar for the embellishment of a number of materials, including plastics.

Tarnish-resisting wrapping cloth, the beryllia filming method of preventing tarnish, and the difficulties of establishing the proposed standard for the weight of silver plate on EPNS articles formed the main subjects in the chemical laboratory displays.

Examples of the development programme in the research office included demonstrations of the production of costume jewellery by the direct casting of low melting alloys into rubber moulds and the subsequent polishing, plating and finishing. Another section was devoted to what comprises a good polish, methods of measuring it, and how labour can be reduced by mechanised methods.

U.K.-U.S. Molasses Deal

BRITISH and American interests have contracted to buy the whole of Cuba's 1951 exportable supply of blackstrap molasses, at a price of 20 cents a gal. This compares with an average of five to six cents per gal. paid this year. Cuban production of blackstrap molasses in 1951 is expected to amount to 300 million gallons, of which 140 million gallons have be sold to American buyers and 50 million gallons to British buyers. The remaining 110 million gallons will be retained in Cuba to satisfy domestic needs.

Blackstrap molasses is important in the explosives and synthetic rubber.
manufacture of alcohol and indirectly of

POWELL DUFFRYN NOTICES

Half a Laboratory Staff 'Redundant'

MORE than half the scientific staff of the Powell Duffryn research laboratories, Battersea, are stated to have received dismissal notices last week-end. This was disclosed at a meeting of staff on Monday at the headquarters of the Association of Scientific Workers.

Mr. J. K. Dutton, southern regional organiser of the association, to which members of the Battersea staff belong, said after the meeting that those declared redundant had received the exact length of notice to which they were legally entitled. The union considered that this action imposed hardship on its members. It meant that a large number of men specialising in the same subject and living in a small area would have to look for work at the same time.

After the list of dismissed scientists had been considered, the general opinion of the meeting was that those asked to continue work at Hayes (THE CHEMICAL AGE, *63*, 674) represented a fair cross section of the staff. A letter has been sent to the management asking them to reconsider their decision.

Polystyrene for Australia

MONSANTO Chemicals (Australia), Ltd., is shortly to start building a £A.250,000 plant to manufacture Lustrex polystyrene. The first in Australia, the plant will be at Monsanto's Melbourne factory, and will ultimately be large enough to satisfy all Australian requirements.

The use of polystyrene by the Australian plastics industry has so far been limited because it has been available only from North America. The Australian plant and the recently completed plant of Monsanto Chemicals, Ltd., at Newport, Monmouthshire, will ensure adequate supplies of Lustrex in the sterling area.

The design of the plant is based upon information supplied by the associated Monsanto Company in the U.S.A., and the process will involve the conversion of styrene monomer to polystyrene suitable for moulding. Styrene monomer will be imported from the rebuilt Monsanto Texas City plant. Production of styrene monomer is also planned in Great Britain.

Swiss Dyestuffs for Russia

The value of Swiss dyestuffs exports to the U.S.S.R. shrank to Fr. 70,000 in the first half of the year compared with Fr. 1,425,000 in six months of 1949.

ANOTHER CHEMICAL EXPORT RECORD

October Total Approaches £10.6 Million

THE October total value of chemical exports, including drugs, dyes and colours, at £10,599,994 constituted a new high record. It was £397,433 more than the September record of £10,202,561 and contrasted arrestingly with the October, 1949, total of £7,640,808. Some outstanding values in October (the figure for the corresponding month of 1949 is shown in brackets) were: cresylic acid £88,865 (£28,117); sulphate of alumina £53,826 (£30,386); bleaching powder £21,503 (£18,291); collodion cotton £41,802 (£19,308); copper sulphate £251,467 (£24,712); lead acetate £79,918 (£28,615); magnesium compounds £44,896 (£25,476); nickel salts £40,989 (£18,961); potassium compounds £108,066 (£47,553); salt £184,164 (£121,341); sodium carbonate £301,315 (£155,405); caustic soda £512,717 (£308,142).

Non-ferrous metals exports also showed some notable increases.

	Oct., 1950	Oct., 1949
	Gal.	Gal.
Cresylic acid	372,008	132,451
	Lb.	Lb.
Salicylic acid	96,862	169,694
Value of all other sorts of acid ...	£226,806	£137,749
	Tons	Tons
Sulphate of alumina	4,584	2,756
All other aluminium compounds	2,485	2,336
Ammonium sulphate	29,314	45,463
Ammonium nitrate	3,346	3,191
All other sorts of ammonium compounds	1,797	1,638
	Cwt.	Cwt.
Bleaching powder	18,975	13,568
All other bleaching materials ...	13,920	9,099
Collodion cotton	5,007	2,264
	Tons	Tons
Copper sulphate	4,655	649
	Cwt.	Cwt.
Disinfectants, insecticides, etc.	46,832	55,603
	Tons	Tons
Fertilisers	2,106	1,786
Value of gases (compressed, liquid or solidified)	£29,605	£41,264
	Cwt.	Cwt.
Lead acetate, litharge, red lead, etc.	13,713	5,378
	Gal.	Gal.
Tetra-ethyl lead	89,334	122,937
	Tons	Tons
Magnesium compounds ...	1,132	520
	Cwt.	Cwt.
Nickel salts	6,611	4,041
Potassium compounds ...	11,716	4,923
	Tons	Tons
Salt	25,151	18,573
	Cwt.	Cwt.
Sodium carbonate	503,025	311,050
Caustic soda	449,664	271,344
Sodium silicate	28,708	33,117
Sodium sulphate	4,892	56,986
All other sodium compounds ...	88,536	91,177
	Gal.	Gal.
Tar, creosote, anthracene oils ...	2,787,309	4,004,273
	Tons	Tons
Zinc oxide	1,593	1,442
Total value of chemical manufactures (excluding drugs and dyestuffs)	£6,146,088	£4,383,177
Value of quinine and quinine salts	£40,587	£21,259
	Oct., 1950	Oct., 1949
	Lb.	Lb.
Acetyl salicylic acid	211,913	156,201
	100 International Units	100 International Units
Insulin	706,224	1,060,645

	Mega Units	Mega Units
Penicillin	1,285,262	881,084
Total value of drugs, medicines and preparations	£2,164,622	£1,608,853
Total value of dyes and dyestuffs	£925,269	£663,682
Total value of paints, pigments and colours	£1,364,015	£985,096
Total value of chemicals, drugs, dyes and colours	£10,599,994	£7,640,808
Total value of all plastic materials	£929,246	£437,178
	Cwt.	Cwt.
Chemical glassware	1,299	1,240
Value	£50,028	£48,643
	Cwt.	Cwt.
Fans	3,564	5,703
Value	£99,693	£138,199
	Cwt.	Cwt.
Furnace plant	5,380	6,244
Value	£73,208	£85,446
	Cwt.	Cwt.
Gas and chemical machinery ...	18,289	26,565
Value	£208,647	£307,633
Value of scientific instruments (optical)	£79,995	£117,513
Value of thermometers, mercury-in-glass instruments, etc. ...	£43,635	£41,128
	Cwt.	Cwt.
Air and gas compressors and exhausters	13,409	10,083
Value	£284,991	£199,330
Non-ferrous Metals—	Cwt.	Cwt.
Aluminium and aluminium alloys	124,920	93,261
Value	£1,515,885	£1,061,807
	Lb.	Lb.
Bismuth metal (not including alloys)	66,918	25,086
Value	£49,588	£13,791
	Cwt.	Cwt.
Brass and other alloys of copper, other than nickel alloys	100,164	91,405
Value	£1,184,337	£863,127
	Tons	Tons
Copper	4,272	6,921
Value	£996,441	£1,087,185
	Tons	Tons
Lead, unwrought, sheets, etc.	585	297
Value	£91,860	£40,667
	Cwt.	Cwt.
Nickel and manufactures ...	12,032	23,369
Value	£235,046	£353,518
	Cwt.	Cwt.
Nickel alloys	3 305	2,633
Value	£69,737	£47,172
Value tin, unwrought ...	£925,115	£493,812
Value tungsten	£20,776	£26,047
Value zinc	£137,878	£49,007
Total value of non-ferrous metals group	£6,420,856	£5,177,045

OIL FROM COAL

£1 m. South African Company

A PUBLIC company to produce oil from coal has been registered in Pretoria with a nominal capital of £1 million. The formation of the company follows the recent announcement that the Government had decided to guarantee the financing of the project to the extent of £13 million (THE CHEMICAL AGE, 63, 391). It will be known as the South African Coal, Oil and Gas Corporation, and its basic products will be crude petrol, diesel oil and certain quantities of gas.

The company has options on more than 600 million tons of coal, which is greater than the potential of the Witbank coalfields. In the initial stages, the company plans to produce 35 million gallons of petrol yearly for consumption in the interior. Matters of policy are still under consideration, but it was stated in Johannesburg by the vice-chairman of the company that the price of the petrol would be competitive. He said that fuel oil would probably not be produced from coal in South Africa for at least three years.

Mr. A Brink, technical manager of the Anglo-Alpha Cement Co., Ltd., has been appointed construction manager of this new oil-from-coal project. Mr. P. E. I. Rousseau, the managing director, is visiting Britain, Germany and France to carry our further investigations into coal-oil processes and gasification.

U.K. Total Still Inadequate

THE inability of the nationalised coal industry to sustain production at the level required by the growing requirements of United Kingdom industries and the small export trade was disclosed in the revelation this week by the Minister of Fuel that it would be necessary to buy overseas the equivalent of " part of one week's output." Weekly coal output has recently averaged rather less than 4.5 million tons. In his statement in the House of Commons Mr. Noel Baker said some of this coal would be bought from the U.S.A. to compensate for the fact that opencast output would fall short of the estimate by about 750,000 tons and deep-mined coal would not exceed the lower estimate of the last Economic Survey (205 million tons).

Although coal production last week was slightly larger than in the previous week, it was 86,100 tons less than in the corresponding week of last year. The total was 4,433,000 tons.

PLASTICS AND POLYMERS

Federation's Prize Scheme

PRIZES valued up to £150, for award in June 1951, are offered by the Council of the British Plastics Federation, as administrators of the Bowen (Cables and Plastics) Prize Fund.

The prizes (a maximum of three) will be awarded for suitable papers on scientific contributions in chemistry, chemical engineering, physics, or engineering, having a bearing on plastics or polymers. The papers should have been read during the period September 1950, to June 1951, before the Plastics Institute or its branches or the Plastics and Polymer Group of the Society of Chemical Industry, including the symposium or the convention held in connection with the British Plastics Exhibition in June next year.

Papers may be submitted direct without submission to any of the bodies. If a paper so forwarded has not already been published and qualifies for an award, it should be published in a suitable journal in agreement with the council of the British Plastics Federation.

The award of any prizes may be withheld if the papers submitted are not considered of a sufficiently high standard.

Contributions may be forwarded by the responsible councils or committees of the organisations concerned or may be forwarded direct by the author so as to reach the British Plastics Federation not later than Friday, June 29, 1951.

European Chemical Surpluses

THE possibility that Italy may have a disposable surplus of 80,000 metric tons of sulphur (and Belgium 500 tons) is indicated in the OEEC publication of lists of exportable surpluses of chemicals by European countries, a few copies of which reached the Board of Trade and trade associations this week. The figures show that in July this year Germany expected a monthly surplus of 110,000 metric tons of carbon black and France a total surplus of 10,000 metric tons of copper sulphate. Great Britain's two " ample " surpluses (no tonnages are quoted) were disinfectants, insecticides, etc., and arsenical acids. Adequate supplies included chlorine, ammonia, sodium, ammonium, zinc and aluminium chlorides, naphthalene and coal tar. Solid caustic soda and carbon black, nitric and phosphoric acids, hydrogen peroxide, certain grades of barium chloride and toluene were limited.

NEW SYNTHETIC FIBRES

Advantages of the Wide U.S. Research Policy

NOWHERE else in the world was the search for new synthetic fibres being so avidly and enthusiastically pursued as in the U.S.A., where the number of chemists engaged was far in excess of the total number in the whole of the British textile industry.

This point was made by Mr. J. G. Evans, chief chemist of the Bradford Dyers' Association, in an address to a joint meeting of the Yorkshire section of the SCI and the Society of Dyers and Colourists at Huddersfield last week.

In many aspects of new fibre development America was leaping ahead. Mr. Evans urged the need to start research on these new fibres at British universities and technical colleges in order that a new generation would enter the industry forearmed. Leeds, at present, was the only university in the country carrying out such research, but the effect was too small. He had no illusion that a man-made fibre approaching wool in all its potentialities was to be seen at present, but he believed it more than likely that several would be found whose properties would make them more suitable for what are now regarded as legitimate uses of wool. Quite irrespective of the price of wool, research into the production of synthetic fibres would continue, " even if wool was given away." It was inexorable progress; when the right fibres were produced they would be in regular production and steady in price.

In the opinion of Mr. Evans, the potential impact of the new fibres far transcended the already substantial contribution made by rayon. With some thousands of new synthetic fibres potentially available, the field was so large and chemists' experience in it only beginning; later technical advances would surely produce cheaper fibres of new technical merit.

Referring to Britain's position in this wider exploitation, there was (excluding Ardil), only one other fibre (apart from rayon and nylon) which had been announced in this country as being under development. This was Terylene, discovered by Whinfield and Jackson of Calico Printers' Association, Ltd., and now under development by I.C.I., Ltd., (THE CHEMICAL AGE, *63*, 705). In the U.S.A., fibres in production, or announced as projected, included Saran (or Velon), Fibre V, Orlon, Vinyon N and Dynel polyethylene fibre, and Polyfibre.

Science Exhibition for the Blind

AN attempt to help blind and partially-blind people to understand some of the developments in modern industrial chemistry forms an important section of an exhibition opened last week at the Science Museum, South Kensington.

A pioneer exhibition of this kind was held last year and proved a great success. The present display is larger and better arranged. There are 100 exhibits so dispersed that each one can be touched by the visitors. Each item is also described in Braille on aluminium panels, while there are also labels in ordinary type.

In the chemical section examples of natural and synthetic fibres may be compared by " feel." The process of producing vanillin, the chemical principle of vanilla, from cloves is demonstrated in another exhibit.

Here another sense—that of smell—is brought into play. Each stage from the original clove to the final production of vanilla has its own distinctive odour. Touch amplifies the picture.

Pupils from the Chorley Wood College for Blind Girls comparing synthetic and natural fibres at the Science Museum exhibition, which remains open until December 10

ORGANIC PHOSPHORUS INSECTICIDES

A *Survey of Recent German Investigations*

SOME interesting details of German work on the use of organic phosphorus compounds as insecticides have recently been given by Dr. G. Schrader in *Angew. Chem.* (*62*, 20, 471-3).

The author, who has been engaged on this type of work since 1934, says that one of the first important results obtained was the discovery of organic phosphorus compounds with powerful insecticidal (contact) effect, without, however, also requiring the presence of fluorine in the molecule. These compounds were prepared by reacting dimethylamino-phosphoric dichloride with sodium acetate in the presence of dry alcohol. The method was patented in 1937.

TEPP

Structurally, the reaction consists in attaching an acid group to the central P atom, in addition to double bond oxygen and two like or different substituents (alkoxyl groups or the radicle of a secondary base). Several derivatives of pyrophosphoric acid were obtained by similar methods, including the tetraethyl ester. Patents were applied for this ester in 1938, but were held on the secret list by the Army authorities in 1939. A new synthesis of the ester, from *o,o,o*-triethylphosphate and diethylphosphoric dichloride, was included.

The tetraethyl ester is a strong poison for warm-blooded insects, and has remarkably strong contact even in 0.01 to 0.1 per cent dilution, against leaf lice of all kinds, red spider, caterpillars, etc. It is now usually called TEPP and was one of the German insecticides investigated by the Allied intelligence commissions in 1945. In its newest form it is much more stable in the presence of water.

By reacting a substituted phosphoric mono-chloride with the corresponding alkyl ester at high temperatures numerous pyrophosphoric esteramides and amides may be prepared. Full details of these are given. The nitrogen derivatives of TEPP are water-soluble, colourless liquids that may be completely distilled in vacuum (1-3 mm.). The subcutaneous toxic dose, according to G. Hecht, is 3-18 mg./kg. as sprays of 0.05-0.2 per cent dilution these derivatives are very effective against leaf and other pests.

A particularly interesting feature of this group, observed by the author and co-workers in 1939-1941, is that living plants absorb the active principle from the sprayed material through roots and leaves. After 3-4 weeks many of the usual kinds of insect pests visiting these plants are destroyed. This has since been confirmed by further research in other countries, and in England the preparation Pestox III has been made available commercially.

The reaction products of phosphorus oxychloride with triethyl phosphate comprise another group of insecticides, from which preparations of the Bladan type are obtained. A new insecticide under this name was first introduced in Germany in 1944, as an effective substitute for nicotine, and has since been the subject of extensive study. Its essential constituent is purophosphoric-tetraethyl ester. Commercially, a mixture containing up to 20 per cent of this ester is now available as HETP (hexaethyl-tetraphosphate). Hydrolysis of both HETP and TEPP has been studied by J. A. Ketelaar and A. H. Bloksma. Large scale production of Bladan has been investigated by W. H. Woodstock.

In order to obtain alkali- and water-stable preparations certain thiophosphoric compounds were studied. A satisfactory product appeared to have been found in dithio-pyrophosphoric-tetraethyl ester, as prepared by A. E. and B. A. Arbusov. This also is a very effective contact insecticide. According to Hecht the sub-cutaneous toxic dose for white mice is 8 mg./kg. Its insecticidal properties, however, seem to have been eclipsed by the more recently developed esters, E 600 (Mintacol) and E 605 (Parathion).

Laboratory Findings

The anhydrides in these compounds were investigated by the author and co-workers to determine whether those of phosphoric acid alone were effective or whether they should be supplemented with others of organic or inorganic acids. The products were tested in the Leverkusen Biological Inst. (H. Küthenthal). The *o,o*-diethyl-phosphoric-*o*-*p*-nitrophenyl ester was first prepared by reacting the sodium salt of *p*-nitrophenol with the chlorophosphoric diethyl ester. Later, direct nitration of the phosphoric-phenyl ester was employed.

The corresponding thio compound (Parathion) was prepared in 1944 by reaction of diethyl-thio-phosphoric monochloride with the sodium salt of *p*-nitrophenol. The ester is a yellow water-insoluble oil crystallising out at 6°C.

SELECTIVE SEPARATION OF XYLENES

*Commercial Possibilities in U.S. Method**

ALTHOUGH the xylene mixture distilled from coal tar has long been used as a commercial solvent, individual isomers have always been much more expensive to produce. Analyses of coal tar xylene and of xylenes from catalytic refining processes have shown all these xylenes to have similar compositions and to contain large amounts of ethyl benzene. Isomer separation has always been difficult because of the similar physical properties of this group.

For example, *o*-xylene, *p*-xylene *m*-xylene and ethyl benzene have boiling points of 144.4, 138.3, 139.1 and 136.2° C. respectively, and although *o*-xylene can now be separated from its isomers by fractional distillation, separation of the other isomers remains very difficult.

Previously, *m*-xylene has been separated by selective sulphonation, based on the principle that its rate of sulphonation is faster than the other isomers and that the rate of the hydrolysis of *m*-xylenesulphonic acid is faster than that of the other xylene-sulphonic acids. The separation of *p*-xylene has been accomplished by freezing but the existence of a *m*,*p*-xylene eutectic mixture limits the amount of *p*-xylene recoverable by this method.

Although various combinations of these methods have been successfully adapted to commercial scale production it is obvious that a cheaper and improved separation process would appreciably increase the demand for individual isomers. A hydrogen fluoride-boron trifluoride extraction process described in *Industrial and Engineering Chemistry* (42, 10, 2103) gives promise of providing, in combination with other methods, a possible method for the separation of each of the xylene isomers in a high state of purity.

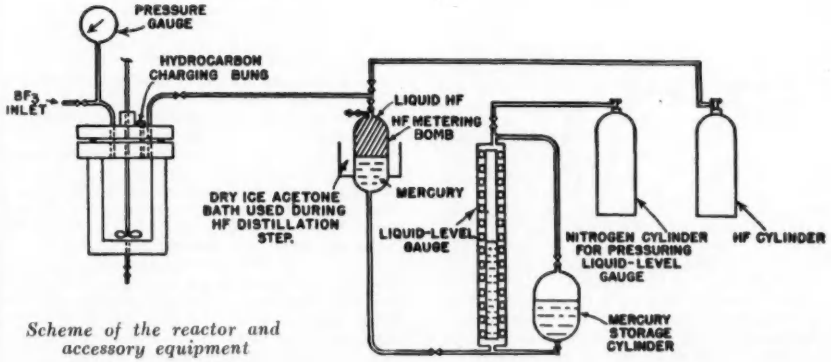
The two lines of research on the problem involved are these: (1) A series of batch extraction experiments, using HF-BF_3 on synthetic mixtures, to give quantitative separation data; (2) A series of vapour pressure measurements made on the three xylene-HF-BF_3 systems, to gain information about the selective solvent action.

Reagents Used

The HF and BF_3 used were commercial grades of 99.6 and 96 per cent purity, respectively. The 4 per cent impurity in the boron trifluoride consisted principally of an inert non-condensable gas. This was separated by evacuation from the BF_3, which was kept at liquid nitrogen temperatures during the pumping period.

The batch-extraction runs were carried out in a 1570-ml. carbon-steel autoclave fitted with a 1725-r.p.m. mechanical stirrer, shown in the diagram. The xylene mixture to be extracted was charged through an opening in the closure plate, after which liquid hydrogen fluoride was added from the metering bomb. The volume of hydrogen fluoride was measured by the amount of mercury displaced from the visual-type liquid-type gauge. (The

* A condensed abstract of an article appearing in "Industrial and Engineering Chemistry" (42, 10, 2103), by D. A. McCauley, B. H. Shoemaker and A. P. Lien of the Standard Oil Company (Indiana).



Scheme of the reactor and accessory equipment

hydrogen fluoride was charged originally to the metering bomb by distillation from a commercial 100-lb. cylinder.)

Boron trifluoride was charged under pressure into the reactor through a valve on the line to the pressure gauge from a small cylinder, which was weighed before and after addition. After the boron trifluoride had been added the mixture was stirred for about 15 minutes at 20° to 25° C. and allowed to settle for another 15 minutes. The acid phase was withdrawn from the bottom of the reactor into a dry ice-cooled flask after which the hydrocarbon phase was removed and washed with ammonium hydroxide to remove traces of dissolved hydrogen fluoride and boron trifluoride.

The extracted xylenes were recovered from the acid phase by displacement with water. About 300 gm. of water were added slowly to the extract-containing copper flask immersed in dry ice-acetone.

Fractionation

After all the water was added, the flask was shaken until it reached room temperature. The contents were then transferred to a copper separating funnel, where the supernatant hydrocarbon was separated from the lower aqueous acid phase. This method was used because of its simplicity, although other experiments showed that the components of the extract phase could be readily separated by distilling the boron trifluoride and hydrogen fluoride from the hydrocarbon.

The hydrocarbon extracts and raffinates of all runs were fractionated on a column of 30 theoretical plates, and the C_8 alkylbenzene fraction of each was analysed by the ultraviolet-absorption technique.

A comparison of the raffinate and extract compositions for all four runs showed that *m*-xylene is selectively extracted by the hydrogen fluoride and boron trifluoride mixture.

In the study of vapour pressure measurements weighed amounts of hydrogen fluoride and hydrocarbon (about five moles of hydrogen fluoride and 0.4 mole of xylene) were introduced into a flask. The flask was attached to the vacuum system, its contents frozen in liquid nitrogen, and the whole system evacuated. The valve to the flask was closed and boron trifluoride gas was passed into the system and allowed to fill the calibrated metering flask to a definite pressure. The valve of the vapour-pressure measuring flask was opened and the boron trifluoride was condensed in this flask.

After several increments were added in this manner, the valve of the metering flask was closed and the vapour-pressure flask was allowed to warm to 0° C. in an ice bath. The flask was agitated by hand at this temperature until a constant pressure was reached; this usually required from one to two hours. After this reading was taken the contents of the flask were again frozen in liquid nitrogen and another increment of boron trifluoride was added.

This cycle was repeated until the partial pressure of boron trifluoride in equilibrium with each liquid phase had reached about 150 cm. of mercury, which is the safe working-pressure limit.

The reaction rate between xylene, hydrogen fluoride, and boron trifluoride is extremely rapid. In all the runs, hydrogen fluoride and xylene were charged to the reactor and boron trifluoride was then added under pressure above the liquid, so that three distinct phases were present: a bottom liquid hydrogen fluoride layer; a middle xylene layer; and a top layer of gaseous boron trifluoride under about 30 to 40 atmospheres pressure.

As soon as the mixture was stirred, an immediate drop in pressure to zero indicated an almost instantaneous reaction between the three components. It appears, therefore, that the rate of action is governed only by the rate of mixing of the three components.

From considerations of this work it is evident that the reactions involved are sufficiently rapid and selective. Ninety-five per cent *m*-xylene can be separated from mixed C_8 alkylbenzenes in a countercurrent extraction tower of four or five theoretical plates. The use of an inert hydrocarbon diluent such as a light naphtha or petroleum ether further improves the extraction selectivity by reducing the amount of xylene "physically" dissolved in the acid layer.

Separation From Complex

The extracted *m*-xylene may be recovered from its complex by vaporising the derived hydrogen fluoride and boron trifluoride at moderately low temperatures —for example, 40° to 70° C. If the process is carried out on a small scale where recovery of reagents is unimportant, the *m*-xylene may be separated by diluting the complex with water.

Ethylbenzene may be separated from the remaining C_8 aromatics merely by adding, in the presence of an inert hydrocarbon solvent such as petroleum ether, enough boron trifluoride at a sufficiently high pressure to combine with all of the xylenes. In these conditions all the xylenes will dissolve in the acid phase and the ethylbenzene will either remain in the hydrocarbon layer or will be converted into benzene and C_{10} aromatics, which boil well outside the xylene range.

DRYING OILS FOR PAINT INDUSTRY

Consideration of Substitutes for Linseed

FOLLOWING an improvement in supplies, the official allocation of linseed oil to the paint and other industries in this country was discontinued as from July 2 (THE CHEMICAL AGE 62, 882). Severe shortage of supplies experienced earlier had, however, stimulated interest in the numerous other types of oils which might be used, leading to the initiation of discussions between representatives of the three paint trade associations—the National Paint Federation, the Paint Manufacturers' and Allied Trades' Association and the Society of British Paint Manufacturers—and the DSIR and the Board of Trade.

The views contributed by the paint industry have been summarised in the *Board of Trade Journal* (*159*, 771-3) which includes the following information.

The " bulk " oils at present in use by the paint industry in this country are linseed oil, tung oil and castor oil, while the main smaller quantity oils are stillingia, tobacco seed and oiticica oil. Soya-bean oil is used on a large scale in the United States, but due to lack of supplies and shortage of dollars it has not been available, except experimentally, to paint firms in this country.

The total annual use of paint oils in the United Kingdom during the last year or two has been about 62,000 tons, made up roughly of 48,000 tons of linseed oil, 8000 tons of tung oil, 3500 tons castor and 2500 tons of stillingia, oiticica and tobacco seed oil taken together. The total consumption, it is expected, will gradually increase in line with general industrial production, etc.

Sources of Linseed Oil

Linseed oil, the most extensively used paint oil, has recently come mainly from Argentina and Uruguay. This is in sharp contrast to the position before the war. In the years 1936-38, about 70 per cent by value of our imports of linseed and linseed oil came from India, and 17 per cent from Argentina (imports from India and Argentina were almost entirely linseed, not oil). In the years 1947-49 only 15 per cent by value came from India and 75 per cent from Argentina (very largely oil). Some supplies have also been secured from Uruguay. India has now far less available for export.

Paint oils can be classified from the point of view of chemical constitution as: (a) Mainly linolenic rich oils, notably linseed; also stillingia and conophor. (b) Linoleic rich oils, *e.g.*, soya bean, sunflower, rubberseed, and tobacco seed. (c) Conjugated oils, *e.g.*, tung, oiticica. (d) Castor oil, which is in a special class.

Technical knowledge to-day is sufficient to admit a high degree of interchangeability of oils when subjected to suitable processing. Such processing may assume various forms and the future pattern of oil usage by the paint industry may well be such that the total quantity is more important than the relative amounts of each type. Such interchangeability has obvious advantages in meeting shortages of particular oils or fluctuations in price at any particular time. Nevertheless, linseed oil seems likely to remain the principal oil used by the paint industry.

No Complete Substitute

No oil, probably, could strictly be said to be a complete substitute for linseed oil, in the sense of having all its properties identical with those of linseed oil. Such studies as have so far been made suggest that conophor oil may come nearest to this requirement. Tests carried out on varnishes and paints made from this oil suggested that in practice it was likely to prove at least equal or even superior to linseed oil for many purposes. It was agreed by the group that it should command a price at least as high as linseed oil, and probably a higher price, for the relatively limited quantities likely to be available in the early stages of any commercial development.

Some 2000 tons of stillingia oil were imported into the U.K. in 1949, all from China. It is a valuable alternative to linseed oil and should, it is considered, normally command about the same price. The oils from rubberseed, soya bean and possibly sunflower would be useful to the paint industry and their value would be enhanced by fractionation, a process by which the drying status (as measured by iodine value) of a portion of the oil is raised, leaving a residue more suitable for other industrial purposes, or as a food oil.

Such tests as were carried out on two small consignments of candlenut oil from Fiji showed that it should prove useful as a drying oil. It has, in fact, been used for

some time in Australia and reports indicate that paints can be made in part from it equivalent to those based on linseed oil.

Tests made with tobacco seed oil showed that it is somewhat inferior to linseed oil, being slower in bodying and below linseed oil standards in weathering and water and alkali resistance. It is, however, a useful oil, which gives substantially better results in admixture with tung oil. A few hundred tons are already being used annually in the U.K.

No long-term problem is expected in the supply of conjugated oil, mainly tung oil, if the projects already started in Nyasaland are developed on the lines proposed. It is understood that in due course the output will reach 10,000 tons per annum, which is estimated to be sufficient for Great Britain's needs; but this is not likely to occur before 1965.

A very large variety of processes for treatment of paint oils is known and many are already used in this country. The paint industry representatives, however, feel that it is important that any new processes which make for greater flexibility in the treatment of drying oils should be at the service of the industry wherever they are likely to justify development in this country. This would permit a readier acceptance of a variety of feed stock oils, particularly linoleic oils such as soya bean, sunflower and rubberseed, even in relatively small parcels.

The process of solvent-fractionation, using either furfural or propane as the solvent, has been given considerable attention; it is a process which requires specialised plant and continuity of feed oil supply at a rate of some 15,000 tons per annum for economic working. Plant for such treatment is already operating in the United States but it is difficult to say whether in present conditions there would be sufficient supply and demand for such treated oils in the United Kingdom to make the project economically practicable.

Glass-Lined Equipment for Organic Preparations

GLASS-lined cast iron or mild steel reaction vessels, stirrers, stills and condensers were used by Mr. C. H. G. Hands and Mr. F. R. Whitt to demonstrate points in their paper on "The Use of Glass-lined Equipment in the Preparation of Organic Compounds", which they presented at the recent meeting of the North-Western branch of the Institution of Chemical Engineers, at the College of Technology, Manchester.

Graphited asbestos packings, said the authors, softened with machine oil, gave the least leakage of fluid from glands but routine operations under sub-or super-atmospheric pressure were impossible because of this leakage. Glass-lined cast iron pipes up to 6-in. diameter were used as distillation columns and, due to their large flanges, joints could be made tight enough for use at atmospheric or reduced pressures. Glass-lined double-surface condensers were used for refluxing or distillation work. The useful life of glass-lined vessels was affected as much by the thermal shocks received as by the corrosive nature of the acidic substances used.

In general, the vessels failed by cracking of the lining at a sharp radius, and stirrers, thermometer pockets and dip-legs had a shorter life than reaction vessels for this reason. Alternate heating and cooling caused cracks but pinhole leaks were the cause of few failures. Condensers failed mostly by pinholes and flaking at the vapour entrance. Heat transfer tests showed the high value of the resistance at the wall of the vessel. Oil heating was successful but electric trip heaters placed vertically on the walls of an oil-filled jacket caused the lining to be destroyed by excessive flaking.

Experimental determinations of jacket film heat transfer coefficients for Merrill oil, Dowtherm and tetracresyl silicate, formed the subject of a paper presented by Mr. E. Barton and Miss E. V. Williams. The properties and costs of the three materials were given. The heat transfer co-efficients were measured in a jacketed pan with the three fluids flowing in turn through the jacket, where the flow is neither turbulent nor streamline because of its distortion by convection currents.

The heat transfer fluids were pumped through the jacket by a gear pump and a liquid was contained in the pan. Coefficients were measured with liquid boiling in the pan and when the liquid was heated from cold. Due allowances were made for heat losses from the surfaces of the pan. As the Reynolds number for flow of the materials at the full annulus of the jacket was never more than 1000, the best correlation for such conditions was that of Colburn and Hougen, who supposed the velocities caused by thermal gradients had the predominant effect on heat transfer and that the resistance to heat flow should be determined by the temperature of the fluid and the temperature difference.

PROBLEMS OF SMOKE PREVENTION

Misuse of Coal May Cost £50 m. A Year

by ALBERT PARKER, C.B.E., D.Sc.*

GROSS contamination of the atmosphere in many towns is part of the price that has so far had to be paid for the development of industry, to enable this country to support a rapidly increasing population on a rising standard of living. Need we continue to pay this heavy price for progress, or is it practicable greatly to reduce atmospheric pollution, particularly that caused by smoke and grit?

In 1948, one of the most recent years for which statistics on coal consumption are available, the total inland consumption of coal, excluding coastwise bunkers, was 190 million tons. This amount was divided among the main broad uses as shown by the figures in the second column of the table.

Of the total of 190 million tons, which includes all the coal that gave rise to atmospheric pollution in this country, about 46 million tons, or rather less than one quarter, was carbonised in coke ovens, gas works, and low-temperature carbonisation plants to provide coke or solid smokeless fuel, gas, tar, motor spirit, fertilisers and raw materials for chemicals. The remainder, 144 million tons, was burned as raw coal with various efficiencies, and with the production of large quantities of smoke and other polluting substances. It included 37 million tons used in household grates, or about one fifth of the inland consumption of 190 million tons.

Pollution Estimates

The figures in the table show that the weight of carbonaceous and tarry matter in the smoke produced was 2 million tons a year. Roughly, one half of this smoke was derived from domestic grates, though they used only about one fifth of the coal consumed. The total pollution by oxides of sulphur was in the region of 5 million tons, and the weight of grit or ash discharged into the atmosphere was roughly 0.6 million tons.

The detrimental effects of pollution of the atmosphere by smoke, grit and oxides of sulphur from the use of coal are of many kinds. From estimates that have been attempted it seems that the money equivalent of the damage to buildings, equipment, fabrics, and agriculture, together with the direct waste of fuel in unburnt products, is at least £50 million a year, or an average of more than five shillings for each ton of coal used.

MAIN USES OF COAL AND ESTIMATES OF POLLUTION IN GREAT BRITAIN IN 1948

Type and Use of Fuel	Quantity of coal: millions of tons per annum	Pollution Produced: million of tons per annum		
		Smoke	Ash	Sulphur dioxide*
Coal:				
Domestic use ...	37	0.9	0.1	0.9
Electricity generating stations	29	small	0.2	0.8
Railways ...	15	0.4	0.1	0.4
Other industrial uses	63	0.7	0.2	1.7
Coke and Gas:				
Coke ovens and use of coke ...	22	small	small	0.5
Gas industry:				
At gas works	24	small	small	0.1
Use of gas ...	—	nil	nil	small
Use of coke ...	—	nil	small	0.3
Totals ...	190	2.0	0.6	4.7

* Reduced estimates based on comprehensive recent analyses.

On average, British coals and cokes made from them contain about 1.5 per cent of sulphur. Even with highly efficient boiler installations achieving complete combustion without unduly large quantities of air, the concentration of sulphur dioxide in the flue gas is ordinarily less than 0.1 per cent by volume. As the volume of flue gas produced for each ton of coal burned is in the region of 350,000 to 500,000 cu. ft., the volume discharged each day from a large power station using 2000 tons of coal a day is between 700 million and 1000 million cu. ft.

The problem of removal of sulphur dioxide, therefore, is one of bringing enormous volumes of gas into intimate contact with some solvent or reagent which will rapidly dissolve or react with the sulphur dioxide to give a solution or product easily separated from the gas. Further, the process must not give rise to an objectionable liquid or solid which cannot be disposed of without causing damage or nuisance, and the overall cost must not be too high.

* Abstract of the paper, "Cities Without Smoke," which the director of the Fuel Research Station, DSIR, presented before the Royal Society of Arts in London on November 22.

The only processes that have been developed to the stage of application on a large scale are those that have been operated at the electricity generating stations at Battersea and Fulham. In the Battersea process, the flue gas is washed with Thames river water, and the solution so obtained is oxidised to convert the dissolved sulphite into sulphate. The water containing the sulphate is then discharged to the river.

The process, which removes 90 per cent of the sulphur, is dependent on having a large volume of water containing sufficient alkali to neutralise the acid oxide of sulphur, and on ensuring that the effluent does not unduly pollute the body of water into which it is discharged. About 35 tons of water are required for every ton of coal burned under the boilers, or about 15 million gallons a day for an installation using 2000 tons of coal a day.

There are very few sites in Great Britain where the necessary quantity of water could be obtained, and where the effluent could be discharged without serious difficulty. With new plant at present prices of labour and materials, the overall cost of the process is equivalent to adding about seven shillings to the cost of every ton of coal burned.

There is not yet any satisfactory method at reasonable cost of preventing pollution by oxides of sulphur from the combustion of coal and coke. For installations using very large quantities of coal, coke, and fuel oil, the effects of this pollution at or near ground level might to some extent be mitigated by judicious selection of fuels of low sulphur content, by careful selection of sites, and by discharging the gases through high chimneys.

There remain many problems requiring intensive scientific and technical investigation if satisfactory means of eliminating or very greatly reducing atmospheric pollution are to be found.

NAPT *Reviews New Anti-TB Drugs*

THE annual report for 1949-50 of the National Association for the Prevention of Tuberculosis states:—

"For many years we have been seeking a form of preventive inoculation which might help us with tuberculosis in a way similar to that in which vaccination has prevented smallpox and inoculation has controlled diphtheria. It is now some 40 years since Drs. Albert Calmette and Camille Guérin introduced their vaccine against tuberculosis, usually known as BCG (Bacillus Calmette-Guérin). This vaccine has been used in many countries and at the end of 1949 was introduced into Great Britain. It is now administered to certain groups in the population who are what is called 'tuberculin negative': that is, whose reaction to a simple test shows that they are in need of protection. Among the groups usually chosen are those particularly in contact with tuberculosis, such as young children, nurses and medical students.

"BCG is given at chest clinics and dispensaries free of charge to those considered to need it. So far the method has had a happy reception by the people of this country, and we hope it will be extended in the future. BCG is safe and effective. It is a notable advance in our methods of controlling tuberculosis, and two leaflets on the subject have been published by the NAPT.

"Great hopes were entertained of the American drug streptomycin which has been used in both the United States and this country for several years. In its origin, streptomycin somewhat resembles penicillin, since both of them are made from common moulds which grow in the soil. Here, however, the resemblance ends. Streptomycin has by no means the wide powers of its great forerunner. Streptomycin is, in fact, a remedy for only a relatively few cases of tuberculosis.

"Still Experimental"

"Doctors are sometimes hard-pressed by their patients or patients' relatives to administer streptomycin without regard to the real nature of the case. But the decision in such a matter must be left entirely to the physician. In many cases streptomycin may be without value and may even do harm. The use of this drug is still at an experimental stage, and the NAPT issues a warning on the whole subject in the form of a short leaflet which has had an encouraging reception (What about Streptomycin? Leaflet No. 34).

"Another chemical compound called para-aminosalicylic acid, usually shortened to PAS, has given encouraging results and is now often combined with streptomycin."

The "Tuberculosis Index," now in its fifth year continues to give useful service by publishing lists of references to the subject in world medical and social literature, together with short abstracts of the more significant items.

FIGHTING LIQUID-FED FIRES

Powder Extinguisher Tests at Brentford

DRY chemical extinguishers for fires have been employed for at least 50 years, but recent times have shown an increased interest in new developments of powders, here and in the U.S.A.

Fires which offer the most difficult problems are those involving inflammable liquid. These were the subject of a demonstration at Brentford last week of a new CO_2 dry powder extinguisher (PD.20) designed by the Pyrene Co., Ltd.

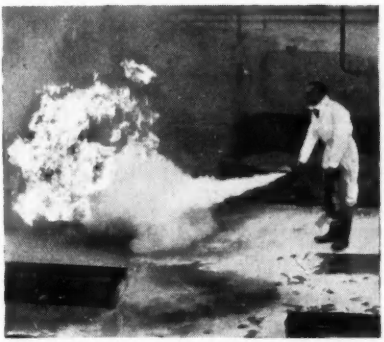
The effectiveness of the extinguisher was shown in a series of tests dealing with fires originating in petrol, oils, alcohols and solvents. Six metal trays (4 ft. by 2 ft.) containing petrol, butanol, acetone, di-iso-butylene, toluol and iso-propyl-alcohol, were ignited and allowed to burn for approximately 30 seconds. All were extinguished with one extinguisher.

The average time to put out each was less than five seconds. Other tests included the extinction of a tray of burning methanol (7 ft. by 4 ft.), in about six seconds and a fuel oil fire covering 100 sq. ft.

Running petrol or solvents, which represent special difficulty, were also successfully dealt with in a final test. A drum of petrol was placed on the top of a wall and the liquid allowed to flow from ½ in. piping, spread over the ground, and was then ignited, and attacked with the extinguisher.

When the finely divided powder was sprayed at high velocity from a distance of about 15 ft. it tended to keep the flames down, but on the occasion of the tests there was no wind to contend with.

The propellant charge of the extinguisher is a heavy concentration of CO_2 which at the same time acts as a supplementary fire-fighting agent. The dry powder is claimed to be not toxic, abrasive, corrosive or conducting and is said not to cake in normal storage conditions.



[By courtesy of The Pyrene Co., Ltd.

The last of six fires being put out by the same extinguisher

The PD.20 extinguisher holds 20 lb. of dry powder in a container constructed to withstand a pressure of 600 p.s.i. A 300 lb. container for coping with inflammable liquids on a larger scale is at present in the course of construction.

This method of dealing with inflammable liquids would seem to be excellent for out-of-doors, but rather less suitable for dealing with interior conflagrations.

A smoke detector for use in the baggage compartment of aircraft was another Pyrene product demonstrated.

The Importance of the Technician in Industry

THE application of scientific analysis to modern industrial processes was the theme of an address given by Lord McGowan (chairman, I.C.I., Ltd.) at the annual prize-giving of the Royal Technical College, Glasgow, last Saturday. "On the technical side," he said, "we are continually developing new and better processes and improving old ones. We are applying the tool of scientific analysis to everything we undertake, including the detailed method of study of existing operations. The demand for large numbers of well qualified technical staff which this creates scarcely needs stressing."

Lord McGowan foresaw that when the rearmament programme developed we should find ourselves critically short of labour. This shortage would require increased productivity on the part of all.

Management must believe in, and seek for, continual progress. Its approach to progress must be dynamic. That referred not only to scientific and technical advance, but to human relations in all phases of industrial work.

FOAM SUPPRESSION OF PETROL FIRES

Comparative Studies by the DSIR

A COMPARATIVE study of the effectiveness of foam compounds on fires in petrol and certain industrial solvents, such as methylated spirit, is described in the latest DSIR publication on Fire Research.*

Experience has shown that existing recommendations on the minimum rate of application of foam to oil fires are sound, but that they cannot safely be applied to fires in certain industrial solvents that are miscible with water. In response to requests for advice from several quarters an experimental investigation of the problem was made.

Stabilised Foam

In the tests in the Fire Research Laboratories the rate of formation of a column of foam in contact with a solvent was determined under standard conditions. The method was not directly applicable to chemical foams; it was found, however, that if foams from compounds stabilised with saponin were collected and allowed to subside completely, the resultant liquid could be treated as an air-foam compound solution.

In comparing results of the various experiments the assumption was made that reconstitution does not affect the stability of the chemical foam; even so, whereas the water-miscible solvents reacted with keratin type air-foam solutions to give a gelatinous precipitate and to render them non-foaming, no such effect was observed with chemical foams.

Unfortunately the process of reconstruction could not be applied to all types of chemical foam and a simple alternative test of stability was therefore devised. Cylinders of foam were prepared and the rate of disappearance of the foam when floating on the surface of the solvent was measured. Industrial methylated spirit was chosen as representative of the water-soluble solvents, and tests were made on the pure solvent and in admixture with an equal volume of water. The results are given in the table.

In view of the small number of types of foam compound examined the report declines to draw general conclusions as to the superiority of chemical foam on petrol fires; one of the chemical foams examined was inferior to the hydrolysed keratin air foam.

Except the commercial product B, the stability of all types of foam was less over petrol than over water, and with all types of foam the stability was considerably less over industrial methylated spirit than over petrol. Dilution of the spirit with an equal volume of water produced a marked increase in stability of foam standing over the liquid.

It was accordingly important to decide whether, as a practical procedure, the more rapid deterioration of foam over certain solvents could be allowed for by a higher rate of application, and if so, what this rate should be.

STABILITY OF FOAM IN CONTACT WITH VARIOUS LIQUIDS (FLOTATION METHOD)

Foam	Time (sec.) for disappearance of half specimen (originally 4.6 cm thick) on			
	Water	Petrol	Industrial methylated spirit	50 per cent industrial methylated spirit and water
AIR FOAMS				
Hydrolysed keratin 3 per cent	600	150	1	5
Soap 3 per cent	90	20	1½	1½
CHEMICAL FOAMS				
Laboratory preparation with saponin	225	210	2	7
,, ,, ,, sulphate lye	120	60	1	40
Commercial product A	1,260	540	5	55
,, ,, B	180	180	40	95

Texas Oil Refinery Explosion

Seven explosions rocked an oil refinery near Port Arthur (Texas), on November 15. Three men were injured, one critically. The blast set off fires which were not extinguished until several hours later. The refinery belongs to the Gulf Oil Corporation, Houston. The explosion and fire began when escaping gas met a fire-box.

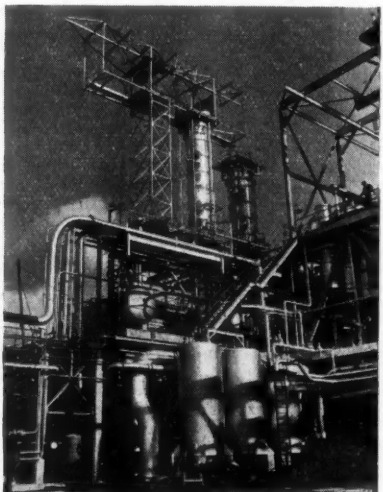
* Report of the Fire Research Board with the Report of the Director of Fire Research for the year 1949. DSIR and Fire Officers' Committee (HMSO 1s. 9d.).

Technical Publications

THE development of petroleum refining in this country confers added interest on the summary of the economical creation by chemical engineers of the M. W. Kellogg Company in the U.S.A. of a surplus process unit into a modern lubricating oil plant. An important phase of the conversion, described and illustrated in the "Kelloggram" (No.4, 1950), was the phenol treating unit. Here, five towers in the former butane isomerisation section were converted directly into the five main towers of the phenol unit.

* * *

QUALITY products of Coalite and Chemical Products, Ltd., set out in a series of data sheets have now been issued in a compact folder for easy reference. Three information booklets also obtainable from the company's oil and chemical division deal with cresylic acids and high boiling tar acids (No. 200); pure mono-hydric and di-hydric phenols (No. 400); and the bactericidal activity of Coalite DXL high boiling tar acids compared with AFD cresylic acid (xylenols) (No. 600).



Already on stream at Shell Haven, six weeks ahead of the scheduled date, Shell Petroleum's new refinery is yielding petroleum and products at the rate of 1.45 *million tons a year. Depicted here are the C4 and C5 columns of the new unit*

FACTUAL information about raw and synthetic rubber, its production, consumption and industrial applications is contained in "Rubber" by A. F. Brazier (price 3s.) published by the Purchasing Officers' Association. This is one of a series of 17 booklets on raw materials intended to cover the syllabus of the association's final examination subject "Raw Materials (Economic and Geographical Survey)." Chemicals and fertilisers, natural and synthetic fibres are among the subjects of this series still to be issued.

* * *

QUICK selection of fans is provided for by the multi-rating tables set out in "Aerofoil Fans" (Publication No. V.1089) issued by Woods of Colchester, Ltd., an associate company of the G.E.C. The tables show at a glance the most suitable fans for any required duty within the capacities of the range. In most cases three or four alternatives are quoted, but for some duties there may be further alternatives, particulars of which can be had on application.

* * *

BIOLOGICAL purification of industrial waste waters is one of the researches described in the DSIR report "Water Pollution Research, 1949" (HMSO, 1s. 6d.). Other work discussed in the report includes an investigation into the effects of aeration on the composition of water and mechanical filtration of sewage effluents.

* * *

A NEW decarbonising solution for the removal of carbon deposits from all internal combustion engines is announced by Jenolite, Ltd., London. The solution operates at a temperature between 75° and 90° C. and the approximate period of immersion is 20 minutes. The process is non-corrosive and the fumes given off are harmless. The wearing of rubber gloves is recommended if the hands are constantly in contact with the solution, which tends to dry the skin.

* * *

FOR the practical execution of sampling inspection by unskilled factory personnel at its works in Holland, Philips have introduced a sampling table from which a suitable and efficient sampling plan can be easily derived for each particular case. The operation of such a plan is described by H. C. Hamaker, J. J. M. Tandin Chabot and F. G. Willemze in "Philips Technical Review" (Vol. II, No. 12).

EXPANSIONS IN CANADA

More Chlorine to be Produced

ABOUT $3 million will be spent by Marathon Paper Mills of Canada, Ltd., to expand its operations at Marathon, Ont. Included in the programme is the construction of a new chemical plant at Marathon for supplying chlorine and other chemicals used in bleaching pulp, and extra steam generating plant to increase the electric power capacity by one third. The new plant will produce 25 tons of chlorine and 27 tons of caustic soda every day, together with certain other chemicals. This will be sufficient to supply all the company's needs of chlorine.

$5m. for Ethylene

The president of Dominion Tar and Chemical Co., Ltd., Mr. A. H. Martin, has announced that the immediate construction of a plant in Montreal East has been authorised. The plant is to produce ethylene glycol and ethylene oxide. Approval has also been given for a substantial increase in the company's facilities for the manufacture of phthalic anhydride. The entire expansion programme will involve an expenditure in excess of $5 million.

The decision to enter the field of ethylene glycol manufacture was made only after several years of study. The project should fit particularly well into the company's over-all development programme.

Synthetic Detergents

Arrangements have been made to get the other principal raw material, ethylene, from the by-product gases of a major oil refinery in Montreal East. Process "know-how" has been obtained from a large U.S. producer of ethylene glycol. The principal use of ethylene glycol is in the manufacture of anti-freeze of the permanent type. Ethylene oxide is an essential raw material in the manufacture of synthetic detergents which are now being produced by one of Dominion Tar's associated companies.

The Diversey Corp. (Canada), Ltd., manufacturers of sanitation chemicals, has opened a new head office plant at Port Credit, Ontario. The administrative headquarters of the company was formerly at Toronto. The new plant covers 12 acres of ground and contains 20,000 square feet of floor space.

A feature of the new plant is a well-equipped laboratory for research.

U.S. BENZENE SHORTAGE

Production from Petroleum

AMONG the many schemes adopted to combat the shortage of petroleum is the so-called platform process—discovered by Dr. Vladimer Haensel and used to improve the quality of motor spirit—by which the Universal Oil Products Company, of Chicago, has begun commercial production of benzine from petroleum. It is understood that the company has developed facilities for the production of about 8 million gallons of benzine a year by this process. At the present time there is an acute shortage of ordinary benzene in the U.S.A.

The Monsanto and Dow companies are reported to have bought 15 million gallons of crude benzene for shipment to the U.S.A. in the next 12 months. This figure alone represents well over six times the amount of benzene imported by the U.S.A. from all sources during any post-war year, states the *Petroleum Times*. The British contractors are stated to be Stevinson, Hardy and Co., Ltd., and National Benzole Co., Ltd.

Directory of Canadian Chemicals

THE Dominion Bureau of Statistics has issued an 82-page directory of the chemical industries of Canada. The present volume, which is based on information available at the beginning of this year, contains an alphabetical list of chemicals and allied products made in Canada and the names and Canadian head office addresses of the firms which produce them.

The directory was compiled in response to frequent requests for complete lists of producers of the growing range of chemicals and chemical products now manufactured in Canada.

Detailed statistics of production, imports and exports of chemicals have not been included in the directory; separate reports of this kind are issued regularly by the Bureau. However, summary tables of the principal statistics—number of plants, employees, salaries and wages, cost of fuel and electricity, cost of materials, and gross value of products—have been included for chemicals and allied products and chemical processes.

High Output of U.S. Aluminium

Production of primary aluminium in the U.S.A. in the third quarter of 1950 was 371,945,743 lb. This was the highest total achieved since the second quarter of 1944.

OVERSEAS

Indian Manganese to U.S.A.

The U.S.A. imported 150,881 tons, nearly 80 per cent of the total of Indian manganese exports, between April and June, 1950.

Uranium for Gold-Bearing Ores

Representatives of the United Kingdom and United States Governments are at present in South Africa discussing with the Union authorities the production of uranium from gold-bearing ores. These discussions are a continuation of those held in the Union during November last year.

French Aluminium Output

A further increase in France's production of aluminium was shown in the October output of 5200 tons, compared with 4990 tons in the previous month. This brought production for the first 10 months of this year to a total of 51,000 tons, an increase of 4200 tons over the corresponding period of 1949.

New U.S. Source of Cresol

The use of *p*-cymene, an abundant constituent of pine oil, as a new material for *p*-cresol is reported from the U.S. The Hercules Powder Co., is operating a pilot plant process for peroxidising *p*-cymene to a methyl cumene hydroperoxide. This is then converted to acetone and *p*-cresol. The cost of the *p*-cresol made by this method is stated to be 50 cents a pound.

China Making Penicillin

On account of the leading U.S. penicillin producers and exporters being now unable to sell penicillin to China, as the greatest part of their current output is bought up by the U.S. Government, the Chinese authorities have established a penicillin plant in the neighbourhood of Hankow with a daily output capacity of 120 million units. The factory is stated to be equipped with U.S. plant.

Sweden Stops Iron-Ore Supplies

The Swedish authorities have ceased to issue export licences for supplies of iron ore to Western Germany. According to the Swedish Ministry of Foreign Affairs, this decision is due to the delay of shipment of West German coke which has seriously affected Sweden's supplies. German supplies of coke have been substantially reduced since October. Shipping difficulties are believed to have been partly responsible.

Norway's £600,000 Urea Factory

The Norske Hydro chemical organisation has completed its £600,000 factory at Heröya, South Norway, for the manufacture of urea. Full production has begun at the rate of 30 tons a day—equivalent to 10,000 tons a year.

Italian Schering Shares for Sale

The Italian Office of Enemy Property has offered for sale the entire share capital—20,000 shares—of the S.A. Italiana Prodotti Schering, Milan, the Italian subsidiary of the German Schering company. The minimum offer has been fixed at 700 million lire.

U.S. Steel Companies Merge

The U.S. Steel Corporation is to merge four of its largest subsidiaries in a single operating company on January 1, 1951. The four companies concerned are: U.S. Steel Corporation of Delaware, the Carnegie-Illinois Steel Corporation, the H. C. Frick Coke Co., and the U.S. Coal and Coke Co.

West Germany Producing Silicones

A West German chemical firm—Alexander Wacker, Ges. für Electrochemische Industrie, GmbH, Munich—has recently commenced the manufacture of silicones. The company is believed to be the first West German producer of this group of products. It is at present producing only liquid silicones but intends to produce the solid next spring.

Penicillin in Eastern Germany

The Madaus works in Radebeul, near Dresden, in the Eastern zone of Germany, is reported to have trebled its output of penicillin following the installation of additional tanks. The manufacture of penicillin tablets has started there recently, and the making of Vitamin D_2 in pure crystalline form was taken up some two months ago to utilise by-products from the manufacture of penicillin.

More Capital for Montecatini

The board of the Montecatini group is to recommend a meeting of shareholders on December 11 an increase of capital from 30 to 40 milliard lire by issuing 20 million shares of nominally 500 lire which are to be offered at par to present shareholders in the proportion of one new share to three old ones. Part of the money is needed to expedite the construction programme in respect of organic chemical products.

· PERSONAL ·

SIR FREDERICK BAIN (deputy chairman, I.C.I., Ltd.), has been elected an honorary member and honorary vice-president of the Association of British Chemical Manufacturers in recognition of his long and distinguished services to the association and the chemical industry. At the time when Sir Frederick would normally have been elected to the chair of the association, he was called upon to assume the presidency of the FBI. In view of his increasing responsibilities and commitments since that date, he has felt unable to undertake the additional responsibilities implied by the chairmanship of the ABCM. This appointment will enable him to retain his membership of the council and his close association with and support of the work it is doing for the chemical industry. MR. I. V. L. FERGUSSON (Evans Medical Supplies, Ltd.), and MR. W. J. WORBOYS (I.C.I., Ltd.), have been elected members of the council, and MR. J. L. HARVEY (Spencer, Chapman & Messel Ltd.), has been invited to join the council as a co-opted member.

SIR FREDERICK BAIN, deputy chairman of I.C.I., Ltd., was taken ill at the farewell dinner party to the retiring U.S. Ambassador on November 14. He fell and injured three ribs, and was taken to hospital. His condition last Tuesday was stated to be improving.

Among the guests who will speak at the annual dinner of the Western Centre branch of the Institution of Incorporated Plant Engineers, in Bristol next Wednesday, are DR. H. J. GOUGH, engineer-in-chief of Lever Bros. and Unilever, Ltd., MR. E. G. PHILLIPS, president of the Institution, and MR. L. G. NORTHCROFT, joint managing director of Spirax Manufacturing Co., Ltd., and Sarco Thermostats, Ltd.

DR. W. GRAHAM KEYWORTH, plant pathologist of the East Malling Research Station, Kent, has arrived in the U.S.A. to spend a year as visiting scientist on the staff of the Connecticut Agricultural Experiment Station, at New Haven. He is particularly interested in the application of chemotherapeutic methods to the problems of plant diseases.

MR. A. H. MULDER, who recently completed 25 years' service with Philips Electrical, Ltd., has been appointed industrial manager for its Midland area.

The Pittsburgh Award for 1950 of the Pittsburgh section of the American Chemical Society—a bronze plaque which is awarded annually for outstanding service to chemistry—is to be presented on December 21 to DR. WILLIAM A. HAMOR, assistant director of the Mellon Institute of Industrial Research, University of Pittsburgh, Pa. He is, *inter alia*, a member of the scientific personnel committee of the U.S. Atomic Energy Commission.

On his retirement from the post of a technical adviser to the Vacuum Oil Co., Ltd., on the lubricating problems of the textile industry, MR. J. W. WARDROP last week was presented with a gift of electroplate at a dinner given by the directors at Bradford.

Royal Society Awards

THE King has approved the award of two Royal Medals for the current year on recommendations made by the council of the Royal Society.

Sir Edward Appleton, G.B.E., K.C.B., F.R.S., principal and vice-chancellor of Edinburgh University, is one recipient for his work on the transmission of electromagnetic waves round the earth and for his investigations of the ionic state of the upper atmosphere.

The other Royal Medal goes to Dr. C. F. A. Pantin, F.R.S., for his contributions to the comparative physiology of in invertibrata.

Further awards announced by the society are as follows:—

Sir James Chadwick, F.R.S., receives the Copley Medal for his work in nuclear physics and in the development of atomic energy, especially for his discovery of the neutron.

The Davy Medal is awarded to Sir John Simonsen, F.R.S., for his researches on the constitution of natural products, especially plant hydrocarbons and derivatives.

For his distinguished contributions to the study of algology Professor F. E. Fritsch, F.R.S., gains the Darwin Medal.

The Hughes Medal is awarded to Professor M. Born, F.R.S., for his contributions to theoretical physics and the development of quantum mechanics.

The pioneering contributions of Air Commodore Sir Frank Whittle, K.B.E., C.B., F.R.S., to the jet propulsion of aircraft are recognised by the award of the Rumford Medal.

HOME

Wolfram Prices Raised

The price of wolfram ore quoted in London on November 20, showed an increase of 5s., at 255s. to 265s. per unit c.i.f. European ports.

Bulk-buying of Chrome Ore Ends

Centralised purchase of chrome ore which has been in force for 10 years ended on November 20, when Government bulk-buying and sale ceased and private trading was resumed. Import of chrome ore will be subject to import licensing regulations.

£1000 Pharmaceutical Scholarship

The Pharmaceutical Society has received £1000 on trust to establish a Humphreys Jones Scholarship in commemoration of the centenary year of the Liverpool School of Pharmacy and Mr. Humphreys Jones' association with the school for over 40 years.

Change of Address

Needing increased office space in London, Woods of Colchester, Ltd., fan manufacturers associated with the General Electric Co., Ltd., is moving the London offices on November 27 to 58-62 High Holborn, London, W.C.1. (Telephone: Chancery 5474/8.)

£1.5 m. Coke Oven Plant

A comprehensive coke oven and by-products recovery plant to be built at Fishburn Colliery in Durham has been ordered by the National Coal Board. With 50 coke ovens it will cost approximately £1.5 million and will carbonise 1000 tons of coal a day, providing blast furnace coke, tar, sulphate of ammonia, benzol and a bulk supply of gas for the Northern Gas Board. The contract has been placed with Woodall-Duckham Co., London.

New Training Centre Opened

Lord Citrine (chairman of the British Electricity Authority) on November 15 opened the employees' training centre which has been established by Lever Bros., Port Sunlight, Ltd., at the former Port Sunlight Hospital. The new headquarters will provide systematic training for all sections of the employees. Lord Citrine was accompanied by Mr. G. A. S. Nairn, chairman of Lever Bros. Port Sunlight undertaking, who, invited Lord Citrine to unveil a memorial plaque.

A Five-Day Week

As from November 20, Ciba Laboratories, Ltd., has adopted a five-day week. Their offices and works at Horsham, Sussex, will accordingly be closed on Saturday mornings.

Scottish Seaweed Research

The Gulland Laboratory of the Scottish Seaweed Research Association, at Inveresk Gate, Musselburgh, was officially opened yesterday by Mr. Hector McNeil, M.P.

China Clay Council Formed

Following a recommendation of the China Clay Working Party, a representative council, to be known as the China Clay Council, has been set up for the industry to advise on methods of increasing efficiency and productivity. The chairman is Lt.-Col. E. H. W. Bolitho.

KID Exemptions

The following items are exempted from Key Industry Duty for the period November 22 to December 31 inclusive: Carbon tetrachloride; *p*-chloromononitrobenzene; *p*-dichlorobenzene; 3: 4-dimethyl-5- sulphanilamide-isooxazole; sodium trichlorophenoxide; *m*-5-xylenol; zinc ethylenebisdithiocarbamate.

Tin Recovers

After a setback at the beginning of the week, quotations for tin on the London Metal Exchange became easier. On November 17 cash tin was £1005-£1015 a ton, while three months changed hands at £949. On November 20, in the closing session there was cash business at £1050 a ton, and three months business had risen by £37 10s. to £985-£988.

U.K. Zinc Supplies

An immediate review of zinc allocations by the Government was being considered, according to a statement by Mr. G. R. Strauss, Minister of Supply, in the House of Commons on November 13. U.K. consumers are now allowed to purchase for delivery each month not more than nine-tenths of their average monthly consumption in 1949. Mr. Strauss said that the relative importance to the economy of different users of zinc and developments since 1949 should be considered. Some temporary adjustments to meet urgent cases had been made for this month.

Law and Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

INDUSTRIAL PLATING & RESEARCH CO., LTD., London, E. (M., 25/11/1950). October 23, mortgage to National Provincial Bank, Ltd., charged on land and buildings to south of Cowley Mill Road, Uxbridge, with plant, fixtures, etc. *Nil. July 8, 1948.

Satisfaction

ERNEST H. KNAPE, LTD., Yelverton, chemists. (M.S., 25/11/1950). Satisfaction October 16, of mortgage registered October 28, 1949.

Company News

Change of Address

The address of L. Light & Co., Ltd., (organic chemicals) has been changed to Poyle Trading Estate, near Colnbrook, Bucks., where their new offices and stores were opened on November 20. The telephone number is Colnbrook 262/3.

Change of Name

The name of METRC CHEMICAL (ILFORD), LTD., of 15a Clarence Terrace, High Street, Barkingside, has been changed to METRO (ILFORD), LTD.

New Registrations

Amasal, Ltd.

Private company. (488,348). Capital £100. To acquire the undertakings of Stafford Salt and Alkali Co., Ltd., Geo. Hamlett and Sons, Ltd., Manger's Salt Works Ltd., Agden Salt Works, Ltd., and Alfred J. Thompson, Ltd.; and to carry on the business of salt proprietors and miners, etc. Subscribers: J. B. Gowman and C. J. Pollard. Solicitors: Clifford-Turner and Co., 11 Old Jewry, E.C.2.

John Dyer Trading Corporation, Ltd.

Private company. (27,987). Capital £1000. Chemists and druggists, etc. Directors: John Dyer, R. Simpson and D. D. Dyer. Reg. office: 307 West George Street, Glasgow, C.2.

Mangers Chemical Co., Ltd.

Private company. (488,428). Capital £100. To acquire the undertakings of (1) Shaka Salt & Chemical Co., Ltd., (2) Quickstryp Chemical Co., Ltd., (3) Mangers Garages, Ltd., and (4) May-Lyon, Ltd., and to carry on business of chemists, druggists, drysalters, oil and colour men and manufacturers of soaps, detergents, etc. Solicitors: Clifford Turner and Co., 11 Old Jewry, E.C.2.

John Shackleton (Chemicals), Ltd.

Private company. (488,256.) Capital £10,000. Objects: To acquire the business of chemical manufacturers and mechants carried on by C. Shackleton, G. D. Shackleton, E. B. Shackleton and S. E. Shackleton as "John Shackleton" at 2 and 4 Tamworth Street, Openshaw. Directors: C. Shackleton, G. D. Shackleton, E. B. Shackleton, E. Shackleton, A. Shackleton and W. Shackleton. Reg. office: 2 Tamworth Street, Openshaw, Manchester.

Stabilag-Company, Ltd.

Private company. (488,188.) Capital £3,000. Manufacturers and importers and exporters of scientific plant, instruments and appliances, etc. Directors: A. York, G. Jones. Reg. Office: 1 Broad Street Buildings, Liverpool Street, E.C.1.

Claim Against Aluminium Group

A CLAIM by Mr. R. H. Mackenzie against the British Aluminium Co., Ltd., for alleged damage to his house by fumes and dust from an aluminium factory at Burntisland was disallowed by Lord Sorn last week.

Reviewing the evidence, his Lordship said that it had not been proved that the condition of the paintwork was due to fumes from the works. While there might have been emissions of dust by overloading of the plants, or other technical reasons, it had not been material enough to amount to a nuisance. The position at Burntisland was not altogether satisfactory. Constant vigilance to minimise breakdown and overloading was required, but he thought the works manager was fully alive to this.

Chemical and Allied Stocks and Shares

BUSINESS in stock markets remained active, helped by a rally in British Funds, but main attention centred on industrials. Buying, however, was selective and focused chiefly on shares of companies considered to offer prospects of higher dividends. Dividend moderation, it is pointed out in the City, does not necessarily mean that payments should be restricted to the same rates as a year ago, when profits have advanced. The rise in costs and the prospect of still higher taxation next year would suggest, however, that many companies may face lower profits in 1951 and their shareholders, reduced dividends.

Even on the basis of unchanged dividends, many shares offer quite attractive yields at current prices, and, in general, industrials probably carry much less speculative risk than commodity and metal shares. It is expected, for example, that there will eventually be considerable falls in tin and rubber from the present exceptionally high levels.

Chemical shares were generally firm and where changed have moved in favour of holders. Imperial Chemical were up to 44s., helped by market confidence that the 10 per cent dividend will be maintained. Monsanto have been steady at 51s. Fisons, at 28s. 3d., held up well, there being a yield of 6¼ per cent on the basis of their 9 per cent dividend. Albright & Wilson were again 31s., with the new 5 per cent preference 22s. Laporte Chemicals 5s. units were 10s. 6d., with Brotherton 10s. shares active up to 21s. 4½d., while Boake Roberts were quoted at 35s. and Burt, Boulton & Haywood were 28s. 9d. F. W. Berk changed hands around 13s. and William Blythe 3s. shares held firm at 9s.

Turner & Newall at 87s. strengthened again, with the expectation that the dividend for the past financial year will be increased. United Molasses firmed up to 47s. The 4s. units of the Distillers Co. were up to 20s., with British Xylonite at 85s. 7½d. Kleemann 1s. shares were 9s. 7½d., and shares of companies connected with plastics also turned firmer on better trading reports. British Industrial Plastics 2s. shares were 6s. 6d. United Glass Bottle were 77s. 6d. Triplex Glass showed activity up to 28s., but later eased a little, although the market believes that there are prospects of higher dividends, especially since the doubling of output capacity at the Birmingham works is to be achieved without raising additional capital.

There was a firmer tendency among paint shares. Lewis Berger 4s. units at 34s. 4½d., and International Paint 4s. units at 16s. 6d., were both helped by the higher interim dividends. Associated Cement eased slightly to 81s. 3d., and British Plaster Board 5s. shares were 15s. 3d. British Oxygen were 88s. "ex rights" to the new shares. Dunlop Rubber have been active over 64s. on the new issue terms.

Glaxo Laboratories were active again up to 58s. 3d. The market believes that when more capital is required in due course this is likely to take the form of an offer of additional shares to shareholders at attractive terms.

Boots Drug have held steady at 50s. and Levers were 43s. 6d. More business was done in oil shares, but best levels were not held. Shell eased to 68s. 9d. after rising to 70s. Royal Dutch Oil shares were active although Paris reports of a share bonus were not confirmed. Apex Trinidad rose to 41s. 3d. on hopes of a higher dividend.

U.S. Curtails Trade with China

THE U.S. Department of Commerce, by control of exports, has withheld strategic materials from Communist China, although private traders have continued to receive valuable imports from China.

Announcing this recently, the U.S. Secretary of Commerce, Mr. Charles Sawyer, said that among the imports received by the U.S. from China were significant quantities of tungsten, tin and tung oil. By contrast, U.S. chemical exports have been sharply reduced, falling in value from $18.7 million in 1948 to $10.4 million in 1949 and to only $1.1 million so far in 1950.

U.S. imports of tungsten from China in 1948 were 3,923,000 lb., increasing to 4,594,000 lb. in 1949 and, for the first six months of 1950, to the very high figure of 6,668,000 lb. U.S. imports of tin in 1948 were 3,641,000 lb.; in 1949, 8,206,000 lb., while in the first half of 1950 2,886,000 lb. were received. In 1949, 43 million lb. of tung oil were imported from China.

Mr. Sawyer stressed that, since January 1950, the U.S. has refused to issue export licences for aviation fuel, lubricating oil or diesel oil to Soviet-dominated countries.

Next Week's Events

MONDAY, NOVEMBER 27

Royal Institute of Chemistry

London: Woolwich Polytechnic, S.E.18, 7.30 p.m. Film display.

Manchester: Reynolds Hall, College of Technology, 6.30 p.m. (Meeting for registered students). Reading of original papers; films.

Royal Society of Arts

London: John Adam Street, Adelphi, W.C.2, 6.30 p.m. W. H. Glanville: "Road Safety and Road Research." First of three Cantor Lectures.

Institute of Rubber Industry

Manchester: Engineers' Club, Albert Square, 6.15 p.m. E. Tunnicliffe: "The Continuous Vulcanisation of Rubber Cables."

TUESDAY, NOVEMBER 28

The Chemical Society

Belfast: Queen's University, 7.30 p.m. Dr. D. Entwistle: "Some Aspects of Cellulose Antoxidation."

Institution of Chemical Engineers

London: Burlington House, Piccadilly, W.1, 6.0 p.m. S. Robson: "Some Chemical Engineering Experiences in the Metallurgical and Chemical Industries."

Society of Instrument Technology

London: Manson House, Portland Place, W.1, 6.30 p.m. Dr. A. R. Boyle: "The Measurement of Viscosity."

Textile Institute

Edinburgh: North British Hotel, 7.30 p.m. Dr. B. P. Ridge: "The New Fibres."

WEDNESDAY, NOVEMBER 29

Royal Institute of Chemistry

Birmingham: University, Edmund Street, 6.30 p.m. Prof. H. W. Melville: "New Techniques for the Investigation of Chemical Reactivity."

Wealdstone: 2.0 p.m. Visit to Kodak, Ltd. (Registered students only).

British Association of Chemists

Liverpool: Radiant House, Bold Street, 7.0 p.m. Scientific film show.

Royal Society of Arts

London: John Adam Street, Adelphi, W.C.2, 2.30 p.m. Lord Horder: "Cities Without Noise."

Fertiliser Society

London: Manson House, Portland Place, W.1, 2.30 p.m. Dr. A. B. Stewart: "Fertiliser Utilisation with Special Reference to Phosphate."

Institution of Electronics

Manchester: Reynolds Hall, College of Technology, 6.30 p.m. G. Syke: "The Beta Ray Thickness Gauge."

THURSDAY, NOVEMBER 30

The Chemical Society

Sheffield: University, 5.30 p.m. Lecture by Prof. M. Stacey.

Institution of Mechanical Engineers

London: Storey's Gate, S.W.1, 10.0 a.m. "Joint Discussion on Heat Insulation." Four papers.

Association of Special Libraries and Information Bureaux

Leeds: Civic Hall. One day conference. Papers on "Libraries for the Study of Science and Technology."

FRIDAY, DECEMBER 1

The Chemical Society

Exeter: Washington Singer Laboratories, Prince of Wales Road, 5.0 p.m. (With RIC and SCI.) Dr. J. Grant: "Paper Making."

Glasgow: Beresford Hall, 6.45 p.m. Ramsay Chemical Dinner.

Manchester: Reynolds Hall, College of Technology 6.30 p.m. (With RIC and SCI.) K. Fearnside: "The Application of Radio-Active Isotopes in Industry."

St. Andrews: United College, 5.0 p.m. Dr. A. F. Coulson: "Micro Techniques in Chemistry."

Royal Institute of Chemistry

London: King's College, W.C.2, 5.15 p.m. Dr. A. J. B. Robertson: "Some General Problems in the Study of Reactions."

Aberdeen: Marischal College, 7.30 p.m. (With Chemical Society and SCI). E. J. Vaughan: "Instrumentation in Modern Methods of Analysis."

Manchester Statistical Society

Manchester: Albert Hall, Peter Street, 6.45 p.m. E. Lord: "How to Choose Between Alternative Statistical Methods."

SATURDAY, DECEMBER 2

Institution of Chemical Engineers

Manchester: Reynolds Hall, College of Technolgy, 3.0 p.m. G. U. Hopton: "The Associate Membership Examination."

Manchester Microscopical Society

Manchester: Geographical Society Buildings, St. Mary's Parsonage, 6.30 p.m. Annual Exhibition.

Prices of British Chemical Products

Dearer Sulphuric Acid, Glycerin and Lead Compounds

ACTIVE trading continues to be the keynote of the industrial chemicals market and most sections are reporting a persistent home demand. The volume of inquiry for shipment is also substantial but the scarcity of containers remains a serious impediment. The soda products and the general run of heavy chemicals are being called for up to the full extent of contracts and replacement bookings for 1951 are being actively sought. The increase in sulphuric acid prices has brought the cost of 140° Tw arsenic-free material to about £5 5s. 6d. per ton and the 168° Tw from £7 5s. 6d. to £8 5s. 6d. per ton. Timonox red star antimony oxide has risen to £222 10s. per ton for minimum 5 ton lots. A good demand, both on home and export account, is reported for most items in the coal tar products market and prices generally remain unchanged.

MANCHESTER.—Strong price conditions remained an outstanding feature of the Manchester market for heavy chemical products. Alkali and potash compounds were in steady demand in the home market. Replacement buying, however, was good in these as well as other products. Shippers' inquiries during the week have represented a fair bulk, while deliveries against home and export bookings have been on a substantial scale. There was a fairly steady movement in supplies of some of the fertiliser materials. Most tar products were in good demand.

GLASGOW.—Business in the Scottish heavy chemicals market continues to make steady progress and inquiries for chemicals and raw materials of every description are on an increasing scale. The main difficulty at the present time seems to be the cutting down of supplies available for the home market by export commitments. Exports have shown renewed activity but supplies are definitely slowing up.

Price Changes

Rises: Antimony oxide, citric acid, cream of tartar, glycerin, lead acetate, lead nitrate, red lead, orange lead, white lead, litharge, sodium acetate, sulphuric acid, tartaric acid, ammonium sulphate, carbolic acid, creosote, pitch.

General Chemicals

Acetic Acid.—Per ton: 80% technical, 1 ton, £69; 80% pure, 1 ton, £74; commercial glacial 1 ton, £82; delivered buyers' premises in returnable barrels; in glass carboys, £7; demijohns, £11 extra.

Acetic Anhydride.—Ton lots d/d, £118 per ton.

Acetone.—Small lots: 5 gal. drums, £90 per ton; 10 gal. drums, £85 per ton. In 40/45 gal. drums less than 1 ton, £70 per ton; 1 to 9 tons, £69 per ton; 10 to 50 tons, £68 per ton; 50 tons and over, £67 per ton.

Alcohol, Industrial Absolute.—50,000 gal. lots, d/d, 2s. 5d. per proof gallon; 5000 gal. lots, d/d, 2s. 6½d. per proof gal.

Alcohol, Diacetone.—Small lots: 5 gal. drums, £133 per ton; 10 gal. drums, £128 per ton. In 40/45 gal. drums: less than 1 ton, £113 per ton; 1 to 9 tons, £112 per ton; 10 to 50 tons, £111 per ton; 50 to 100 tons, £110 per ton; 100 tons and over, £109 per ton.

Alum.—Loose lump, £17 per ton, f.o.r. MANCHESTER: Ground, £17 10s.

Aluminium Sulphate.—Ex works, £11 10s. per ton d/d. MANCHESTER: £11 10s.

Ammonia, Anhydrous.—1s. 9d. to 2s. 3d. per lb.

Ammonium Bicarbonate.—2 cwt. non returnable drums; 1 ton lots £47 per ton.

Ammonium Carbonate.—1 ton lots: MANCHESTER: Powder, £52 d/d.

Ammonium Chloride. — Grey galvanising, £27 10s. per ton, in casks, ex wharf. Fine white 98%, £21 10s. to £22 10s. per ton. See also Salammoniac.

Ammonium Nitrate.—D/d, £18 to £20 per ton.

Ammonium Persulphate. — MANCHESTER: £5 2s. 6d. per cwt. d/d.

Ammonium Phosphate.—Mono- and di-, ton lots, d/d, £78 and £76 10s. per ton.

Amyl Acetate.—In 10-ton lots, £179 10s. per ton.

Antimony Oxide.—£220 per ton.

Antimony Sulphide.—Golden, d/d in 5 cwt. lots, as to grade, etc., 1s. 9½d. to 2s. 4½d. per lb. Crimson, 2s. 6½d. to 3s. 3½d. per lb.

Arsenic.—Per ton, £44 5s. to £47 5s., ex store.

Barium Carbonate.—Precip., d/d; 2-ton lots, £27 5s. per ton, bag packing, ex works.

Barium Chloride.—£35 to £35 10s. per ton.

Barium Sulphate (Dry Blanc Fixe).—Precip., 4-ton lots, £29 10s. per ton d/d; 2-ton lots, £29 15s. per ton.

Bleaching Powder.—£19 10s. per ton in casks (1 ton lots).

Borax.—Per ton for ton lots, in free 140 lb. bags, carriage paid: Anhydrous, £54; in 1-cwt. bags, commercial, granular, £34 10s.; crystal, £37; powder, £38, extra fine powder, £39; B.P., granular, £44; crystal, £46; powder, £48-£48 10s.; extra fine powder £48.

Boric Acid.—Per ton for ton lots in free 1-cwt. bags, carriage paid: Commercial, granular, £62; crystal, £69; powder, £66 10s.; extra fine powder, £68 10s.; B.P., granular, £75 10s.; crystal, £81; powder, £78 10s.; extra fine powder, £80 10s.

Butyl Acetate BSS.—£156 10s. per ton, in 10-ton lots.

Butyl Alcohol BSS.—£143 per ton, in 10-ton lots.

Calcium Bisulphide.—£6 10s. to £7 10s. per ton f.o.r. London.

Calcium Chloride.—70/72% solid £9 12s. 6d. per ton, in 4 ton lots.

Charcoal, Lump.—£25 per ton, ex wharf. Granulated, £30 per ton.

Chlorine, Liquid.—£28 10s. per ton d/d in 16/17-cwt. drums (3-drum lots).

Chrometan.—Crystals, 6d. per lb.

Chromic Acid.—1s. 10d. to 1s. 11d. per lb., less 2½%, d/d U.K.

Citric Acid.—Per lb., d/d buyers' premises, for 5 cwt. or over, anhydrous, 1s. 7d. plus 10 per cent, other, 1s. 7d.; 1 to 5 cwt., anhydrous 1s. 7½d. plus 10 per cent, other 1s. 7½d. Higher prices for smaller quantities. All subject to a trade discount of 5 per cent.

Cobalt Oxide.—Black, delivered, 9s. 10d. per lb.

Copper Carbonate.—MANCHESTER: 2s. per lb.

Copper Chloride.—(63 per cent), d/d, 2s. 2d. per lb.

Copper Oxide.—Black, powdered, about 1s. 4½d. per lb.

Copper Nitrate.—(63 per cent), d/d, 2s. 1d. per lb.

Copper Sulphate.—£60 2s. 6d. to £62 15s. per ton f.o.b., less 2%, in 2-cwt. bags.

Cream of Tartar.—100%, per cwt., about £8 2s. per 10 cwt. lot, d/d.

Ethyl Acetate.—10 tons and upwards, d/d, £114 per ton.

Formaldehyde.—£31 per ton in casks, according to quantity, d/d. MANCHESTER: £32.

Formic Acid.—85%, £66 to £67 10s. per ton, carriage paid.

Glycerin.—Chemically pure, double distilled 1,260 s.g. 227s. 6d.—230s. 6d. per cwt. Refined pale straw industrial, 5s. per cwt. less than chemically pure.

Hexamine.—Technical grade for commercial purposes, about 1s. 4d. per lb.; free-running crystals are quoted at 2s. 1d. to 2s. 3d. per lb.; bulk carriage paid.

Hydrochloric Acid.—Spot, 7s. 6d to 8s 9d. per carboy d/d, according to purity, strength and locality.

Hydrofluoric Acid.—59/60%, about 1s. to 1s. 2d. per lb.

Hydrogen Peroxide.—1s. 0½d. per lb. d/d, carboys extra and returnable.

Iodine.—Resublimed B.P., 18s. per lb. in cwt. lots.

Iodoform.—21s. per lb.

Iron Sulphate.—F.o.r. works, £3 15s. to £4 per ton.

Lactic Acid.—Pale tech., £85 per ton; dark tech., £75 per ton ex works; barrels returnable.

Lead Acetate.—White: £144 10s. per ton.

Lead Carbonate.—Nominal.

Lead Nitrate.—£126 10s. per ton.

Lead, Red.—Basis prices per ton: Genuine dry red lead, £154; orange lead, £166. Ground in oil: red, £173 10s.; orange, £185 10s.

Lead, White.—Basis prices: Dry English, in 8-cwt. casks, £161 per ton. Ground in oil: English, under 2 tons, £177 10s.

Lime Acetate.—Brown, ton lots, d/d, £18 to £20 per ton; grey, 80-82 per cent, ton lots, d/d, £22 to £25 per ton.

Litharge.—£154 per ton.

Lithium Carbonate.—7s. 9d. per lb. net.

Magnesite.—Calcined, in bags, ex works, £27.

Magnesium Carbonate.—Light, commercial, d/d, £74 5s.; cwt. lots £82 10s. per ton d/d.

Magnesium Chloride.—Solid (ex wharf), £15 per ton.

Magnesium Oxide.—Light, commercial, d/d, £187; cwt. lots £192 10s. per ton d/d.

Magnesium Sulphate.—£12 to £14 per ton.

Mercuric Chloride.—Per lb., lump, 8s. 5d.; smaller quantities dearer

Mercurous Chloride.—9s. 4d. per lb., (28 lb. lots).

Mercury Sulphide, Red.—Per lb., from 10s. 3d. for ton lots and over to 10s. 7d. for lots of 7 to under 30 lb.

Methanol.—Pure synthetic, d/d, £28 to £38 per ton.

Methylated Spirit.—Industrial 66° O.P. 100 gals., 4s. 2d. per gal.; pyridinised 64° O.P. 100 gal., 4s. 4d. per gal.

Nickel Sulphate.—F.o.r. works, 3s. 4d. per lb. (Nominal.)

Nitric Acid.—£24 to £26 per ton, ex works.

Oxalic Acid.—About £133 per ton packed in free 5-cwt. casks.

Paraffin Wax.—From £58 10s. to £101 17s. 6d., according to grade for 1 ton lots.

Phosphoric Acid.—Technical (S.G. 1.500), ton lots, carriage paid, £63 10s. per ton; B.P. (S.G.1.750), ton lots, carriage paid, 1s. 1½d. per lb.

Phosphorus.—Red, 3s. per lb. d/d; yellow, 1s. 10d. per lb. d/d.

Potash, Caustic.—Solid, £65 10s. per ton for 1-ton lots; flake, £76 per ton for 1-ton lots. Liquid, d/d, nominal.

Potassium Bichromate. — Crystals and granular, 9½d. per lb.; ground, 10½d. per lb., for not less than 6 cwt.; 1-cwt. lots, ½d. per lb. extra.

Potassium Carbonate.—Calcined, 98/100%, £64 per ton for 1-ton lots, ex store; hydrated, £58 for 1-ton lots.

Potassium Chlorate.—Imported powder and crystals, nominal.

Potassium Chloride.—Industrial, 96 per cent, 6-ton lots, £16.10 per ton.

Potassium Iondide.—B.P., 15s. 5d. per lb. in cwt. lots.

Potassium Nitrate.—Small granular crystals, 76s. per cwt. ex store, according to quantity.

Potassium Permanganate.—B.P., 1s. 7½d. per lb. for 1-cwt. lots; for 3 cwt. and upwards, 1s. 6d. per lb.; technical, £6 13s. to £7 13s. per cwt.; according to quantity d/d.

Potassium Prussiate.—Yellow, nominal.

Salammoniac.—Dog-tooth crystals, £72 10s per ton; medium, £67 10s. per ton; fine white crystals, £21 10s. to £22 10s. per ton, in casks.

Salicylic Acid.—MANCHESTER: 2s. to 3s. 4½d. per lb. d/d.

Soda Ash.—58% ex depôt or d/d, London station, £8 17s. 3d. to £10 14s. 6d. per ton.

Soda, Caustic. — Solid 76/77%; spot, £18 4s. per ton d/d.

Sodium Acetate.—£49-£55 per ton.

Sodium Bicarbonate.—Refined, spot, £11 per ton, in bags.

Sodium Bichromate.—Crystals, cake and powder, 8d. per lb.; anhydrous, 7½d. per lb., net, d/d U.K. in 7-8 cwt. casks.

Sodium Bisulphite. — Powder, 60/62%, £29 12s. 6d. per ton d/d in 2 ton lots for home trade.

Sodium Carbonate Monohydrate.—£25 per ton d/d in minimum ton lots in 2-cwt. free bags.

Sodium Chlorate.—£52 to £57 per ton.

Sodium Cyanide.—100 per cent basis, 8d. to 9d. per lb.

Sodium Fluoride.—D/d, £4 10s. per cwt.

Sodium Hyposulphite. — Pea crystals £23 2s. 6d. a ton; commercial, 1-ton lots, £21 12s. 6d. per ton carriage paid.

Sodium Iodide.—B.P., 16s. 9d. per lb, in cwt. lots.

Sodium Metaphosphate (Calgon).—Flaked, loose in metal drums, £101 10s. ton.

Sodium Metasilicate.—£19 to £19 5s. per ton, d/d U.K. in ton lots.

Sodium Nitrate.—Chilean Industrial, 97-98 per cent, 6-ton lots, d/d station, £23 per ton.

Sodium Nitrite.—£29 10s. per ton.

Sodium Percarbonate.—12½% available oxygen, £7 17s. 9d. per cwt. in 1-cwt. drums.

Sodium Phosphate.—Per ton d/d for ton lots: Di-sodium, crystalline, £32 10s., anhydrous, £65; tri-sodium, crystalline, £32 10s., anhydrous, £64.

Sodium Prussiate.—9d. to 9½d. per lb. ex store.

Sodium Silicate.—£6 to £11 per ton.

Sodium Silicofluoride.—Ex store, nominal.

Sodium Sulphate (Glauber Salt).—£8 per ton d/d.

Sodium Sulphate (Salt Cake).—Unground. £6 per ton d/d station in bulk. MANCHESTER: £6 10s. per ton d/d station.

Sodium Sulphide. — Solid, 60/62%, spot. £25 15s. per ton, d/d, in drums; broken, £27 5s. per ton, d/d, in casks.

Sodium Sulphite.—Anhydrous, £29 10s. per ton; pea crystals, £20 10s. per ton d/d station in kegs; commercial, £12 to £14 per ton d/d station in bags.

Sulphur.—Per ton for 4 tons or more, ground, £15 11s. 6d. to £17 16s. 6d. according to fineness.

Sulphuric Acid.—168° Tw., £7 5s. 6d. to £8 5s. 6d. per ton; 140° Tw., arsenic free £5 10s. per ton; 140° Tw., arsenious, £5 2s. 6d. per ton; Quotations naked at sellers' works.

Tartaric Acid.—Per cwt: 10 cwt. or more £9 5s. 1 cwt. lots £9 10s.

Tin Oxide.—1-cwt. lots d/d £25 10s. (Nominal.)

Titanium Oxide.—Comm., ton lots, d/d, (56 lb. bags) £102 per ton.

Zinc Oxide.—Maximum price per ton for 2-ton lots, d/d; white seal, £142; green seal, £141; red seal, £139 10s.

Zinc Sulphate.—Nominal.

Rubber Chemicals

Antimony Sulphide.—Golden, 4s. to 5s. per lb. Crimson, 2s. 7½d. to 3s. per lb.

Arsenic Sulphide.—Yellow, 1s. 9d. per lb.

Barytes.—Best white bleached, £11-£11 10s. per ton.

Cadmium Sulphide.—6s. to 6s. 6d. per lb.

Carbon Bisulphide.—£37 to £41 per ton, according to quality, in free returnable drums.

Carbon Black.—6d. to 8d. per lb., according to packing.

Carbon Tetrachloride.—£59 10s. per ton.

Chromium Oxide.—Green, 2s. per lb.

India-rubber Substitutes.—White, 10 5/16d. to 1s. 5½d. per lb.; dark, 10½d. to 1s. per lb.

Lithopone.—30%, £44 2s. 6d. per ton.

Mineral Black.—£7 10s. to £10 per ton.

Mineral Rubber, "Rupron."—£20 per ton.

Sulphur Chloride.—7d. per lb.

Vegetable Lamp Black.—£49 per ton.

Vermillion.—Pale or deep, 15s. 6d. per lb. for 7-lb. lots.

Nitrogen Fertilisers

Ammonium Sulphate.—Per ton in 6-ton lots, d/d farmer's nearest station, £12 12s. 6d.

Compound Fertilisers.—Per ton d/d farmer's nearest station, I.C.I. Special No. 1, £20 4s.

"Nitro-Chalk."—£12 9s. 6d. per ton in 6-ton lots, d/d farmer's nearest station.

Sodium Nitrate.—Chilean for 6-ton lots d/d nearest station, £19 17s. 6d. per ton.

Coal-Tar Products

Benzol.—Per gal, ex works: 90's, 3s. 3d.; pure, 3s. 5½d.; nitration grade, 3s. 7½d.

Carbolic Acid.—Crystals, 1s. 1d. to 1s. 3d. per lb. Crude, 60's, 4s. 3d. MANCHESTER: Crystals, 11½d. to 1s. 1½d. per lb., d/d crude, 4s. 3d., naked, at works.

Creosote.—Home trade, 7d. to 10½d. per gal., according to quality, f.o.r. maker's works. MANCHESTER: 6½d. to 9½d. per gal.

Cresylic Acid.—Pale 98%, 3s. 3d. per gal.; 99.5/100%, 3s. 11d. American, duty free, 4s. 2d., naked at works. MANCHESTER: Pale, 99/100%, American, duty free, 7s. per gal.

Naphtha.—Solvent, 90/160°, 2s. 10d. per gal. for 1000-gal. lots; heavy, 90/190°, 2s. 4d. per gal. for 1000-gal. lots, d/d. Drums extra; higher prices for smaller lots. Controlled prices.

Naphthalene.—Crude, ton lots, in sellers' bags, £9 1s. to £12 13s. per ton according to m.p.; hot-pressed, £14 15s. to £15 14s. per ton, in bulk ex works; purified crystals, £28 to £43 5s. per ton. Controlled prices.

Pitch.—Medium, soft, home trade, 90s. per ton f.o.r. suppliers' works; export trade, 120s. per ton f.o.b. suppliers' port. MANCHESTER: £5 10s. f.o.r.

Pyridine.—90/160°, 22s. 6d. MANCHESTER: 20s. to 22s. 6d. per gal.

Toluol.—Pure, 3s. 2½d. per gal. MANCHESTER: Pure, 3s. 2d. per gal. naked.

Xylol.—For 1000-gal. lots, 4s. 0½d. to 4s. 3d. per gal., according to grade, d/d.

Wood Distillation Products

Calcium Acetate.—Brown, £15 per ton; grey, £22.

Methyl Acetone.—40/50%, £56 to £60 per ton.

Wood Creosote.—Unrefined, from 3s. 6d. per gal., according to boiling range.

Wood Naphtha.—Miscible, 4s. 6d to 5s. 6d. per gal.; solvent, 5s. 6d. to 6s. 6d. per gal.

Wood Tar.—£6 to £10 per ton.

Intermediates and Dyes (Prices Nominal)

m-**Cresol** 98/100%.—Nominal.

o-**Cresol** 30/31° C.—Nominal.

p-**Cresol** 34/35° C.—Nominal.

Dichloraniline.—2s. 8½d. per lb.

Dinitrobenzene.—8½d. per lb.

Dinitrotoluene.—48/50° C., 9½d. per lb.; 66/68° C., 1s.

p-**Nitraniline.**—2s. 11d. per lb.

Nitrobenzene.—Spot, 5½d. per lb. in 90-gal. drums, drums extra, 1-ton lots d/d buyers' works.

Nitronaphthalene.—1s. 2d. per lb.; P.G. 1s. 0½d. per lb.

o-**Toluidine.**—1s. per lb., in 8/10-cwt. drums, drums extra.

p-**Toluidine.**—2s. 2d. per lb., in casks.

m-**Xylidine Acetate.**—4s. 5d. per lb., 100%.

Latest Oil Prices

LONDON: November 22.—The following changes in the prices of unrefined oils are effective during the 4-week period ending December 2, 1950: Linseed oil, from £134 to £136 per ton; sunflower acid oil, soya acid oil and maize acid oil from £92 to £94 per ton. Prices of all other unrefined oils and fats and technical animal fats allocated to primary wholesalers will remain unchanged. The prices of all refined oils and imported edible animal fats remain unchanged for the 8-week period ending December 2.

Monsanto's Sales Departments

IT is announced that as from Monday, November 20, the sales departments of Monsanto Chemicals, Ltd., for both home and export business are as follows:—

Allington House, Allington Street, London, S.W.1 (Victoria 8131), will deal with the General Chemicals Department which handles the following:—

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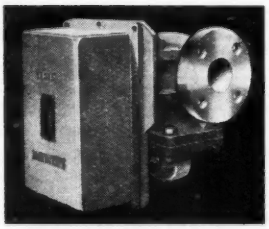

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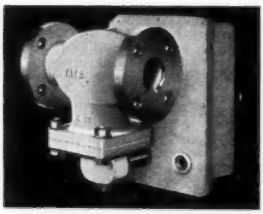

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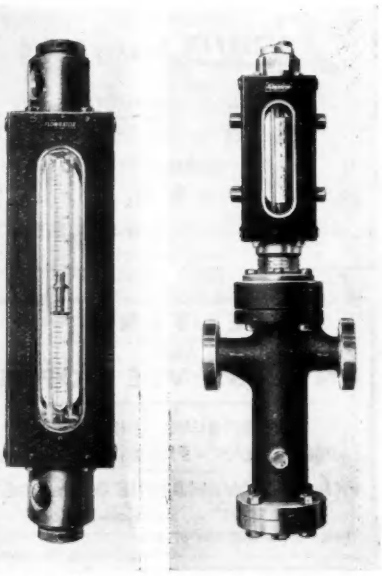
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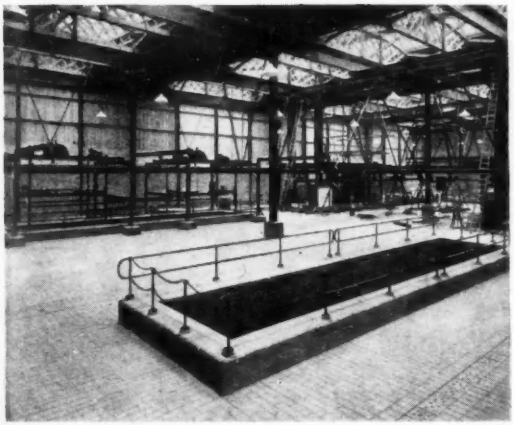

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